



Oct. 16, 2020

NHSaves Energy Efficiency and Active Demand Potential Study Final Results

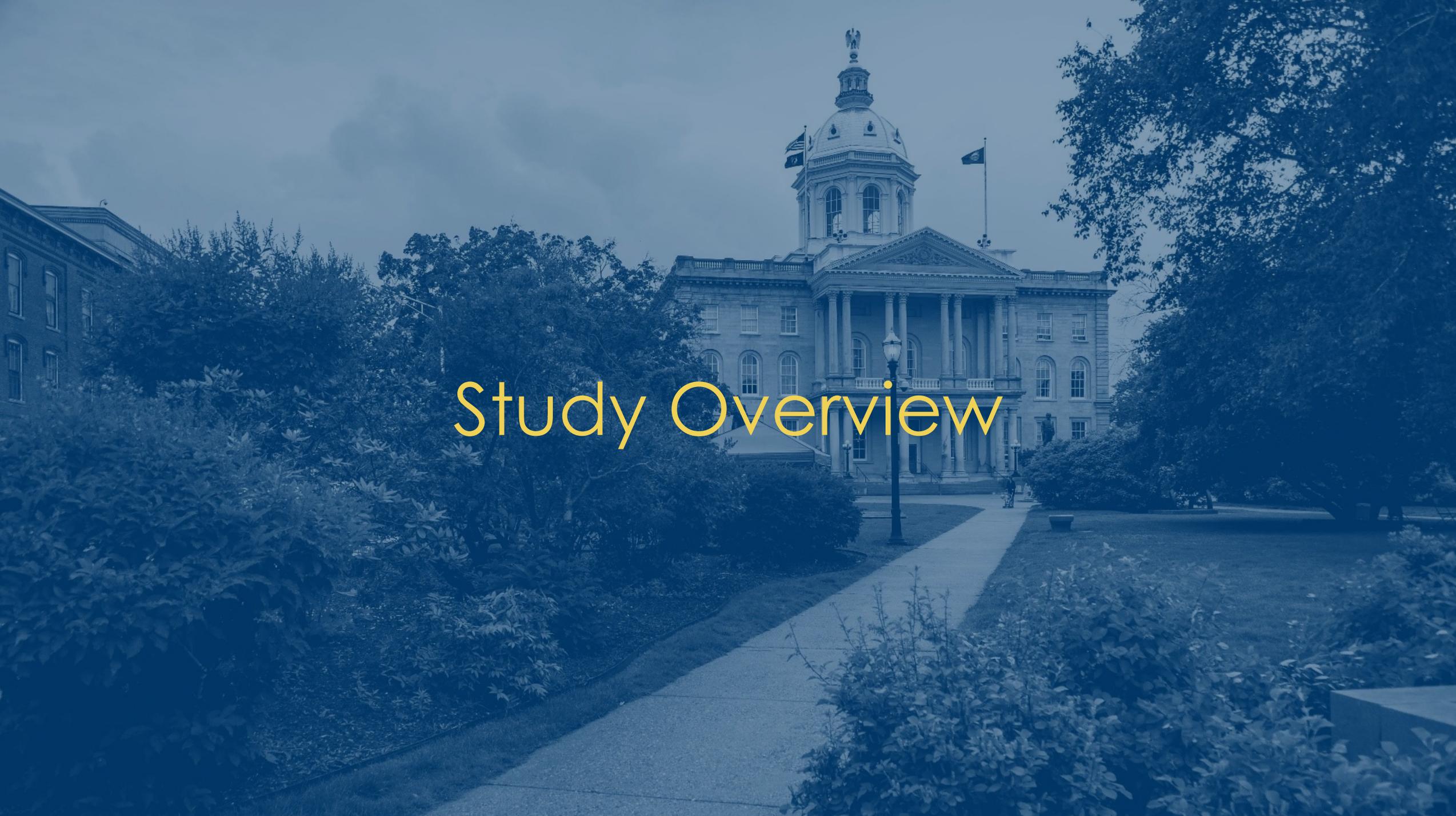
Agenda

Study Overview

Key Study Parameters
2021-2023 Draft Plan Context
Key Changes from Draft Results
Achievable Scenario Definitions

Results

Energy Efficiency
Active Demand



Study Overview

- **Study period:** 2021-2023
- **Statewide Study**
- **Sectors:** Residential, non-residential
- **Target Fuels:** Electricity, natural gas, delivered fuels (fuel oil, propane, kerosene)
- **Basis of savings:** Adjusted gross savings at the meter (*with some exceptions for lighting*)
- **Cost-Effectiveness Test:** Granite State Test

Key differences from Draft 2021-2023 Plan:

- **Residential lighting**

- Draft Plan: Continue to support and incentivize lighting residential programs through 2021; begin to reduce support for residential lighting measures in 2022, focusing on retailers supplying hard-to-reach customers (while monitoring marketplace response to federal standards roll-backs)
- Potential study: Keep lighting programs at full capacity for the complete 2021-2023 period

- **Non-Residential lighting**

- Draft Plan: Assumed Net-to-Gross factor of 1.0 for downstream measures, and declining NTGs (starting at 0.87) for Mid-stream measures
- Potential Study: Assumed same NTG factor for Midstream and Downstream lighting initiatives

- **Other**

- Variation in planned and modeled measures*, delivery strategies
- July 1st Draft Plan take into consideration Covid-19 impact on participation, with material increase in participation in year 3. This market response is not included in the potential study.

Three program scenarios are explored in this study:

Low

Incentives and enabling activities at 2018-2020 New Hampshire Statewide Energy Efficiency Plan levels to simulate **business as usual**

Mid

Raised incentives to a minimum of 75% and increased enabling activities **above and beyond** levels within Statewide Energy Efficiency Plan

Max

Completely **eliminates customer costs** (100% incentive as portion of incremental costs) while maintaining same level of enabling strategies as Mid

Achievable scenarios provide read on program potential, and overall market:

Low

Calibration focus: aims to arrive a reasonable agreement between past programs (2019) and plans (2020) to inform first year results (2021), using the same program settings. Measures not in past programs, calibrated using judgment and evidence from other jurisdictions

Mid

Max

Achievable program savings when incentives are increased and programs apply further enabling strategies and design enhancements

Tech/Econ

Provide a high-level read on the size of the overall possible market (technically and economically feasible), not considering program influence, or market adoption. Largely based on **Baseline Study** results – which is a measure of equipment saturations, as per industry standard. 7



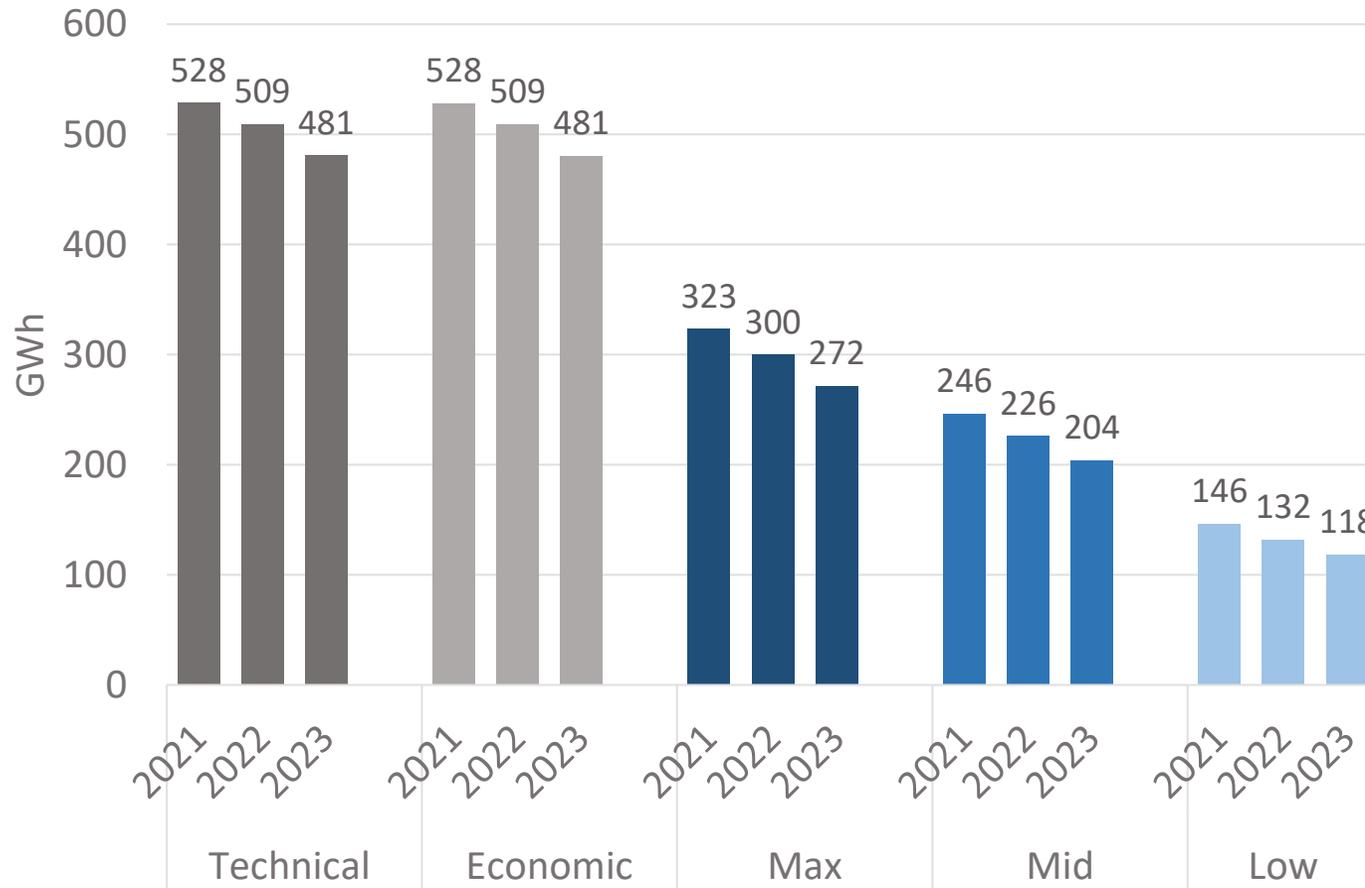
Energy Efficiency High-Level Results

- **DEEP Model populated with granular NH-specific inputs**
 - Residential NH Baseline Study
 - Dunsky's NE commercial market archetype, adjusted with NH specific key metrics
 - Measure savings a combination of deemed savings and detailed algorithms
 - Applies Granite State Test and NH-specific economic inputs (rates, avoided costs, programs etc.)
- **EE Potential assessed using DEEP Model's bottom-up methodology**
 - Each measure-market-segment combination is calculated
 - Adoption is a function of customer cost effectiveness and barrier level
 - Key Calculations: Interactive effects, competition groups, measure chaining, evolving baselines, re-participation, etc.



The savings presented in this section provide an overview of total savings achieved from all electric, natural gas, and delivered fuel measures, including savings (and losses) due to interactive and secondary savings effects

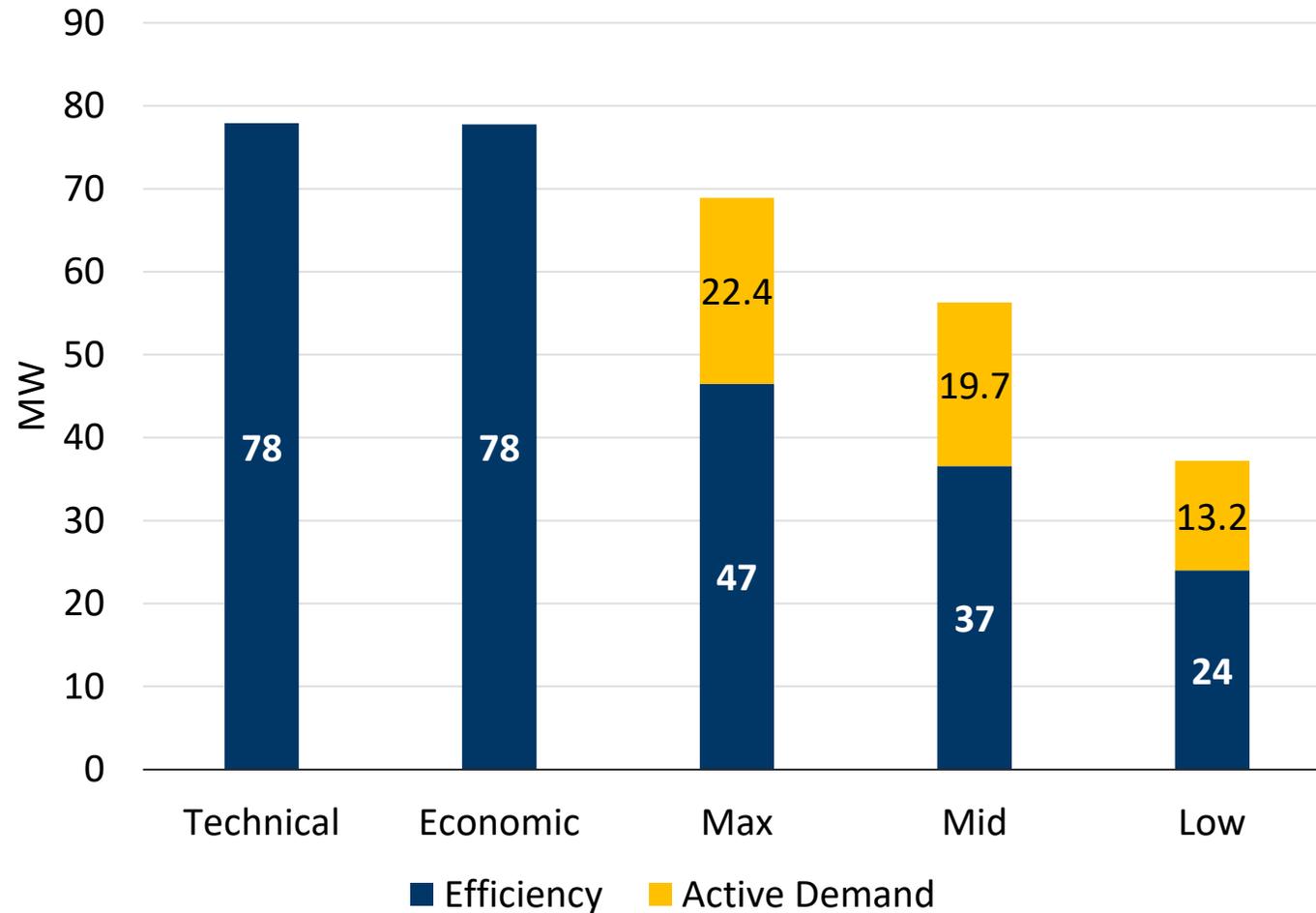
The savings presented are those accruing in the year of their implementation (first year savings)



- Very close technical and economic savings due to screening at the program-level
- Increased incentives and investments towards enabling strategies could increase savings significantly from Low (BAU) levels

2019 Portfolio Results	124 GWh
2021 Draft Plan Target	125 GWh

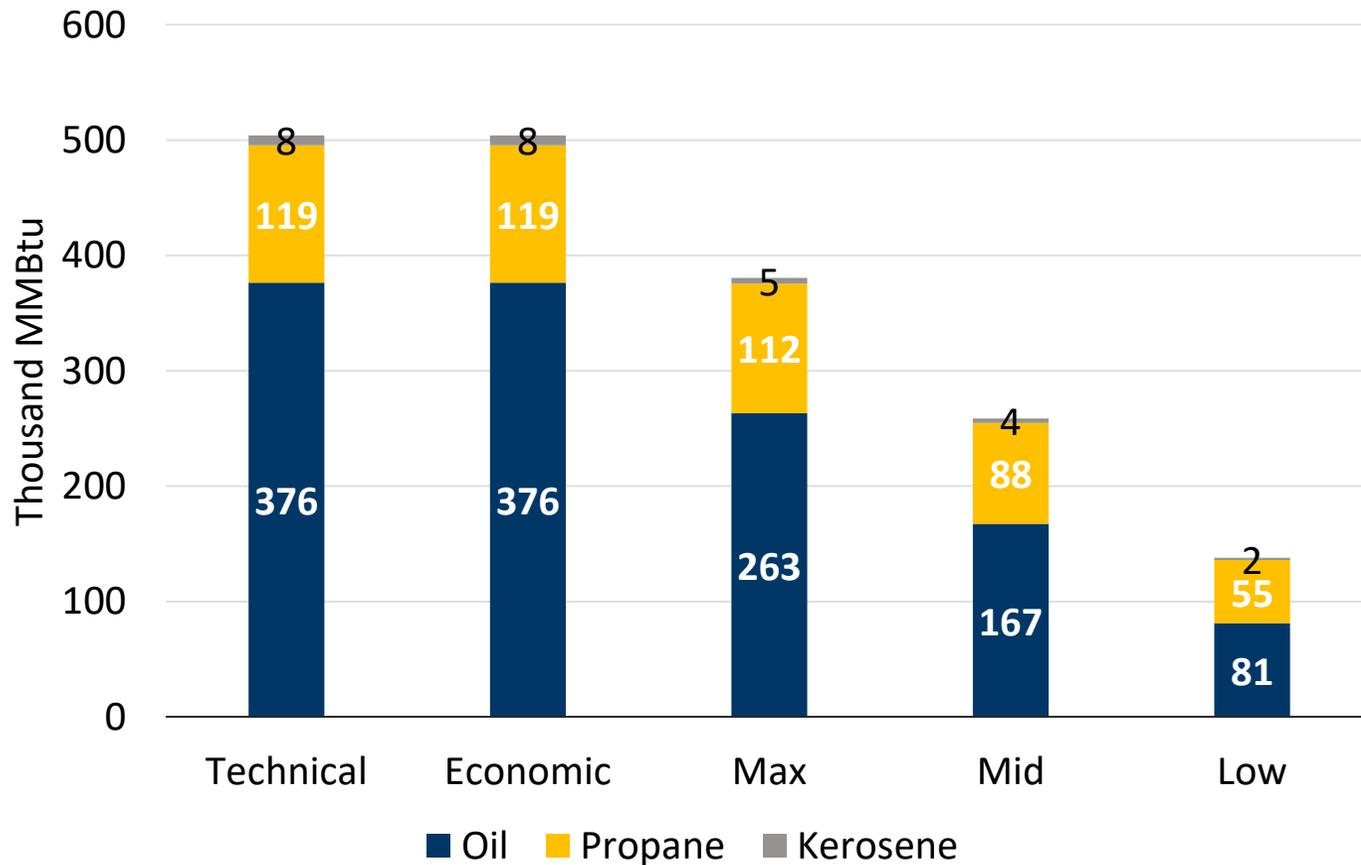
Note: All three study years are shown for the electricity savings to illustrate the impact of using declining NTG for electric measures (a change between draft and final results).



- Majority of savings from passive demand (demand savings from efficiency measures) across all three scenarios
- Significant growth between 2021 and 2023 as Active Demand Reduction Program ramp up.
- 2023 Max Achievable from ADR = 60 MW.

Note: Technical and economic savings from passive demand and active demand are not considered comparable, so only achievable savings are included for active demand here.

2021 Delivered Fuel Savings

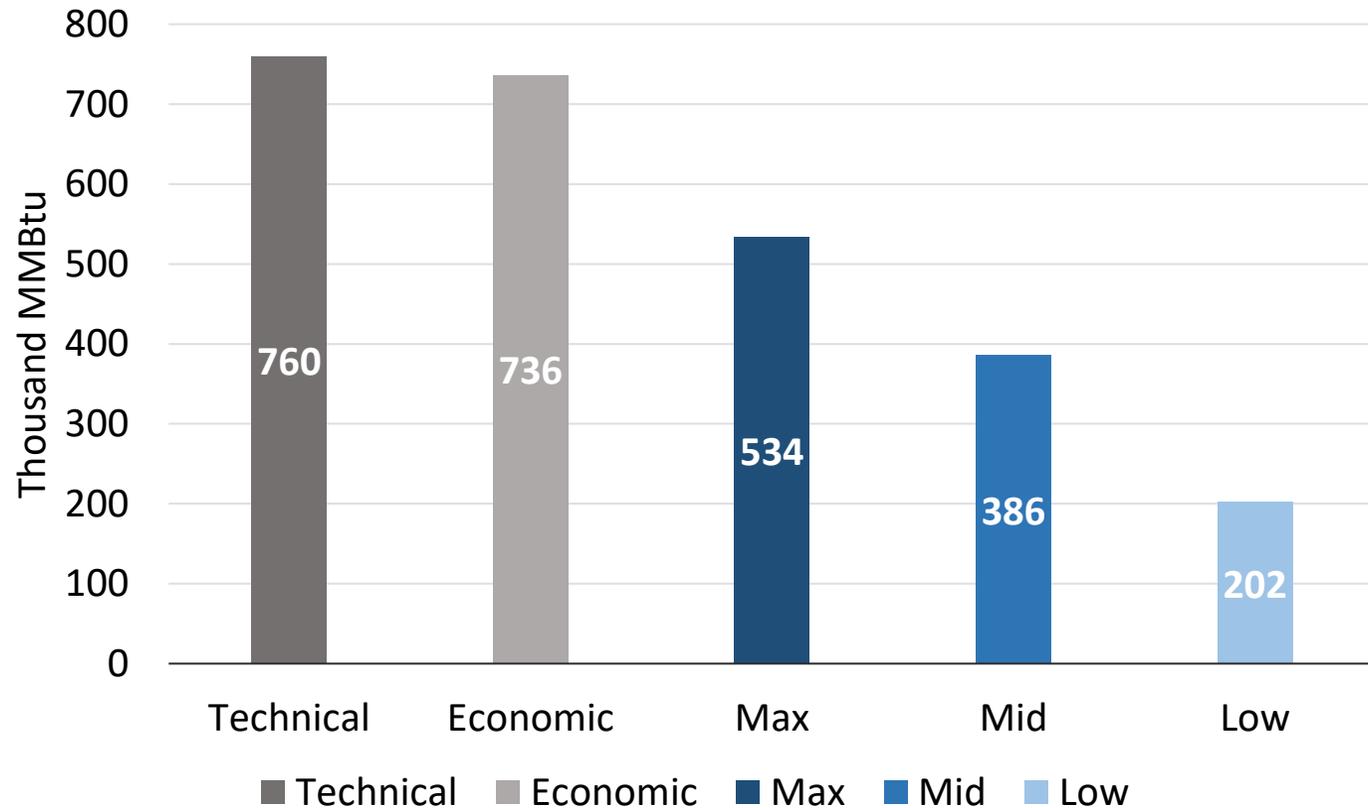


- Greater potential to grow fuel oil savings than propane delivered fuels (+200% vs +100%)

2019 Portfolio Results*	78 Thousand MMBtu
2021 Draft Plan Target*	107 Thousand MMBtu

**All delivered fuel savings*

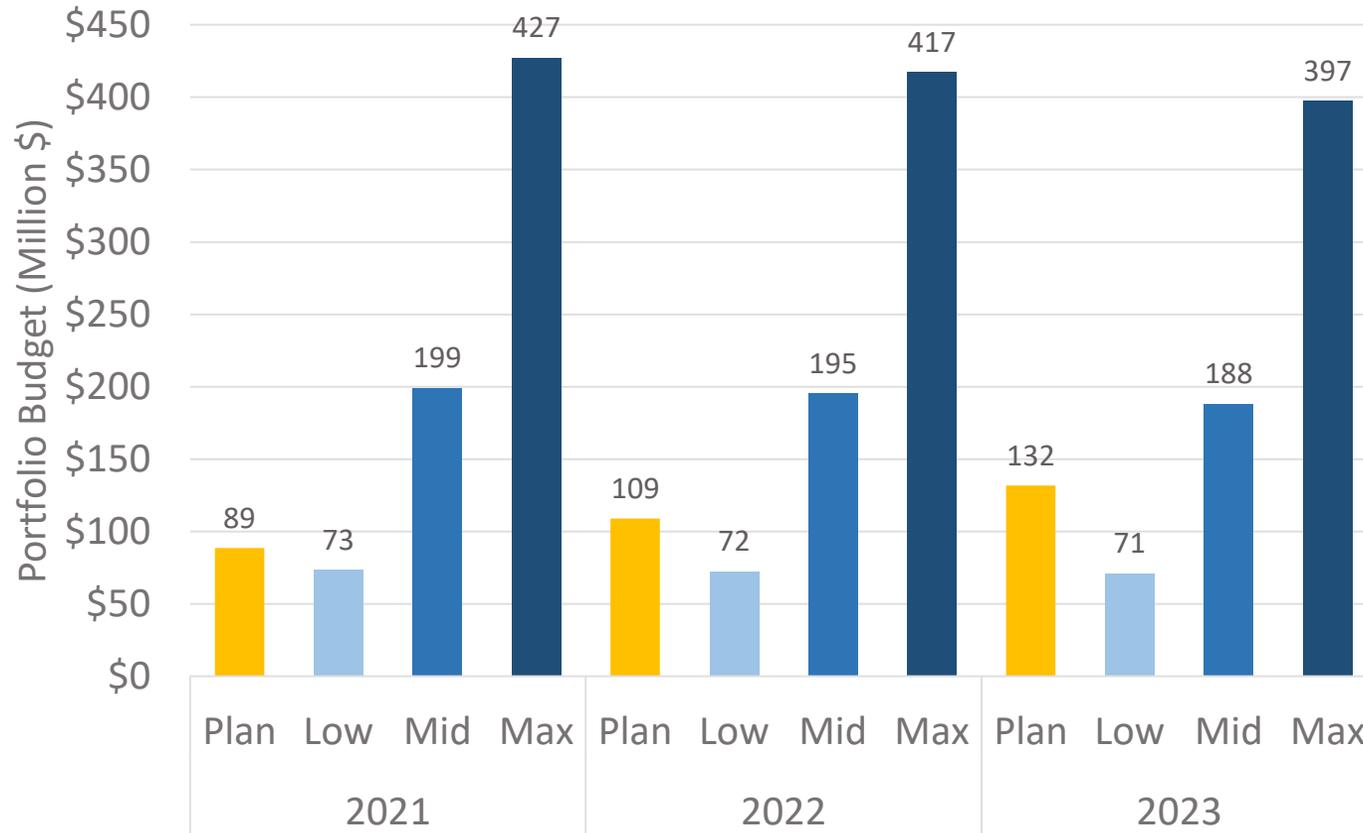
2021 Natural Gas Savings



- Low Scenario well aligned with 2021 Draft Plan
- Increased incentives and investments towards enabling strategies could increase savings by 93% - 175% from Low (BAU) levels

2019 Portfolio Results	209 Thousand MMBtu
2021 Draft Plan Target	198 Thousand MMBtu

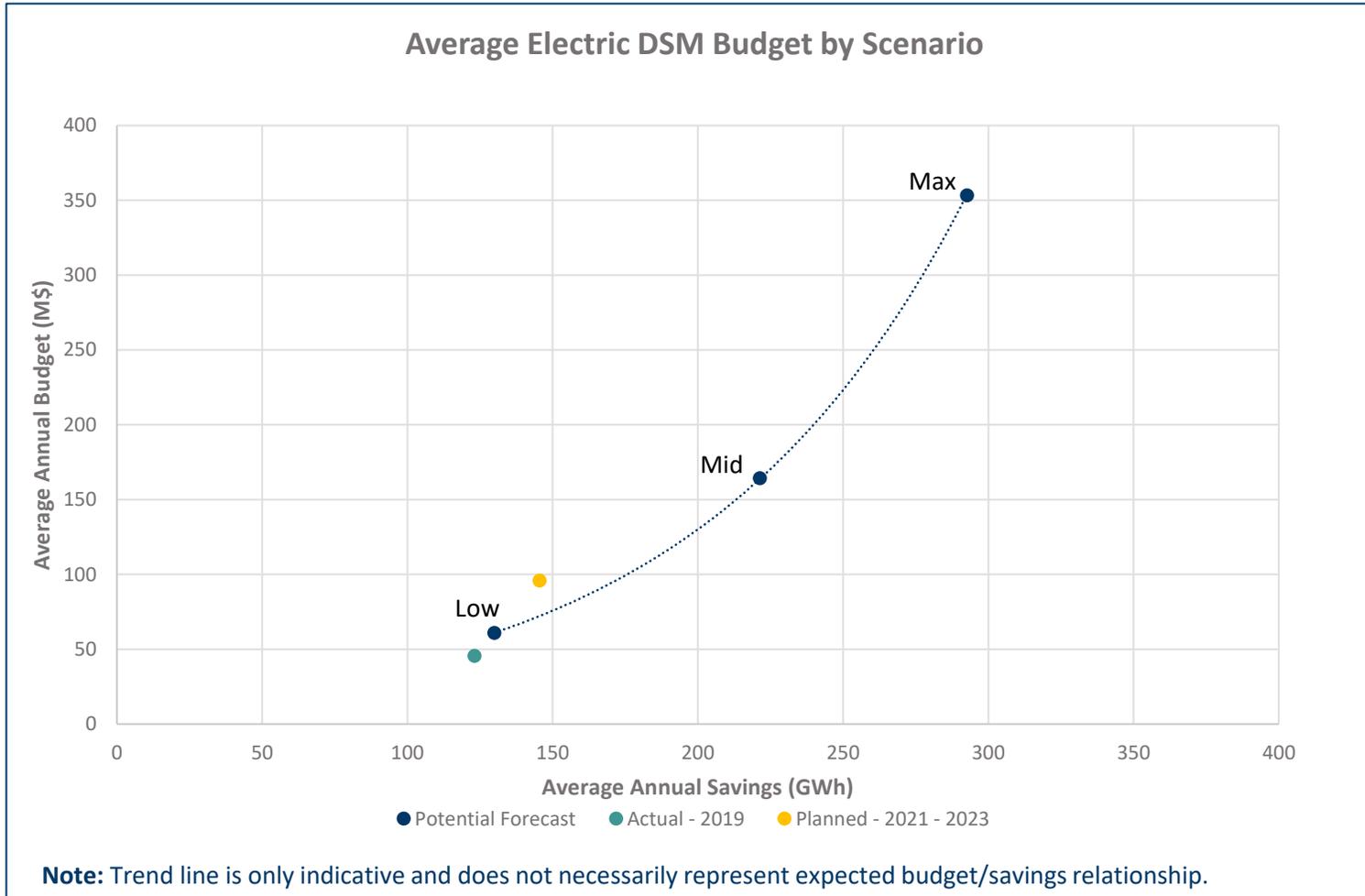
Portfolio-Level Spending



- In the current plan draft, portfolio spending increases considerably each year
- In 2021, planned spending is mostly in-line with the Low scenario, but is closer to the midpoint between Low and Mid by 2023

Note: Forecast spending is highly dependent on assumed measure costs and incentive levels. We noted some differences in the 2021 BCR models provided which are not accounted here, as well as differences in incentive levels.

Electric Utility Program – Budget vs Savings



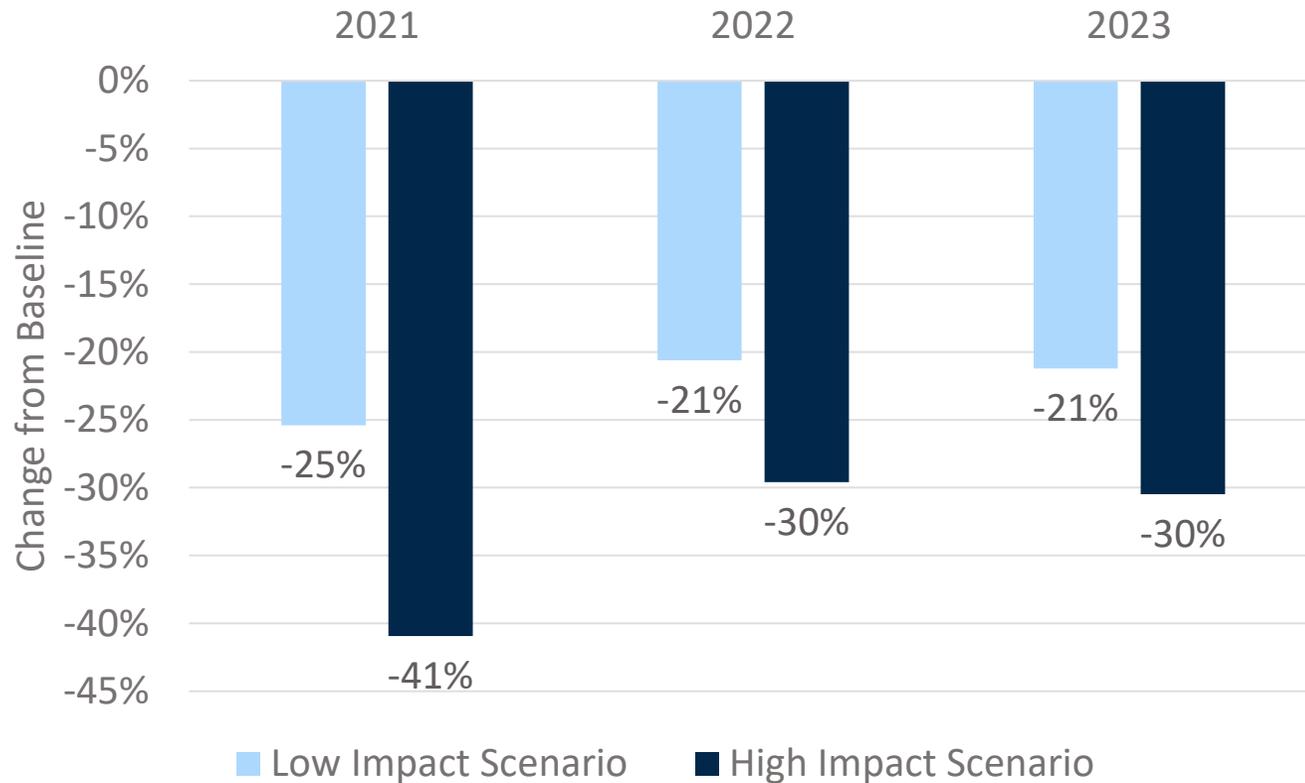
- Increased achievable savings for Mid and Max scenarios require increased unitary investments
- Mid and Max scenario also include barrier reduction strategies

Scenario	\$/kWh (1 st yr)
2019 Actuals	0.37
2021-2023 Planned	0.66
Low Achievable	0.47
Mid Achievable	0.74
Max Achievable	1.21

- Assume program participation will be impacted by two factors: Market size, barrier level
- Established three impact categories:
 - Low: No change in market size, low increased barriers
 - Moderate: Moderate decrease in market size, moderate increased barriers
 - High: High decrease in market size, high increased barriers
- Assigned non-residential segments to impact categories
- Ran two scenarios: Low impact on savings and high impact on savings
 - Different market size and barrier settings for each impact category

Sector	Impact Category	Segments	Low Impact on Savings Scenario	High Impact on Savings Scenario
Non-Residential	Low	Food sales Warehouse	Market size: No change Barriers: Increase by 0.2 for all study years	Market size: No change Barriers: Increased by 0.5 for all study years
	Moderate	Campus/Education Healthcare/Hospitals Lodging Manufacturing/Industrial Office Retail Other	Market size: Reduce 1 st year market size by 10%, return 2 nd and 3 rd year markets to baseline size Barriers: Increase by 0.5 for all study years	Market size: Reduce 1 st year market size by 25%, return 2 nd and 3 rd year markets to baseline size Barriers: Increase by 0.7 for all study years
	High	Food Service	Market size: Reduce market size by 10% for all study years Barriers: Increase by 0.7 for all study years	Market size: Reduce market size by 25% for all study years Barriers: Increase by 1 for all study years
Residential	N/A	N/A	Market size: No change Barriers: Increase by 0.2 for all study years	Market size: No change Barriers: Increased by 0.5 for all study years

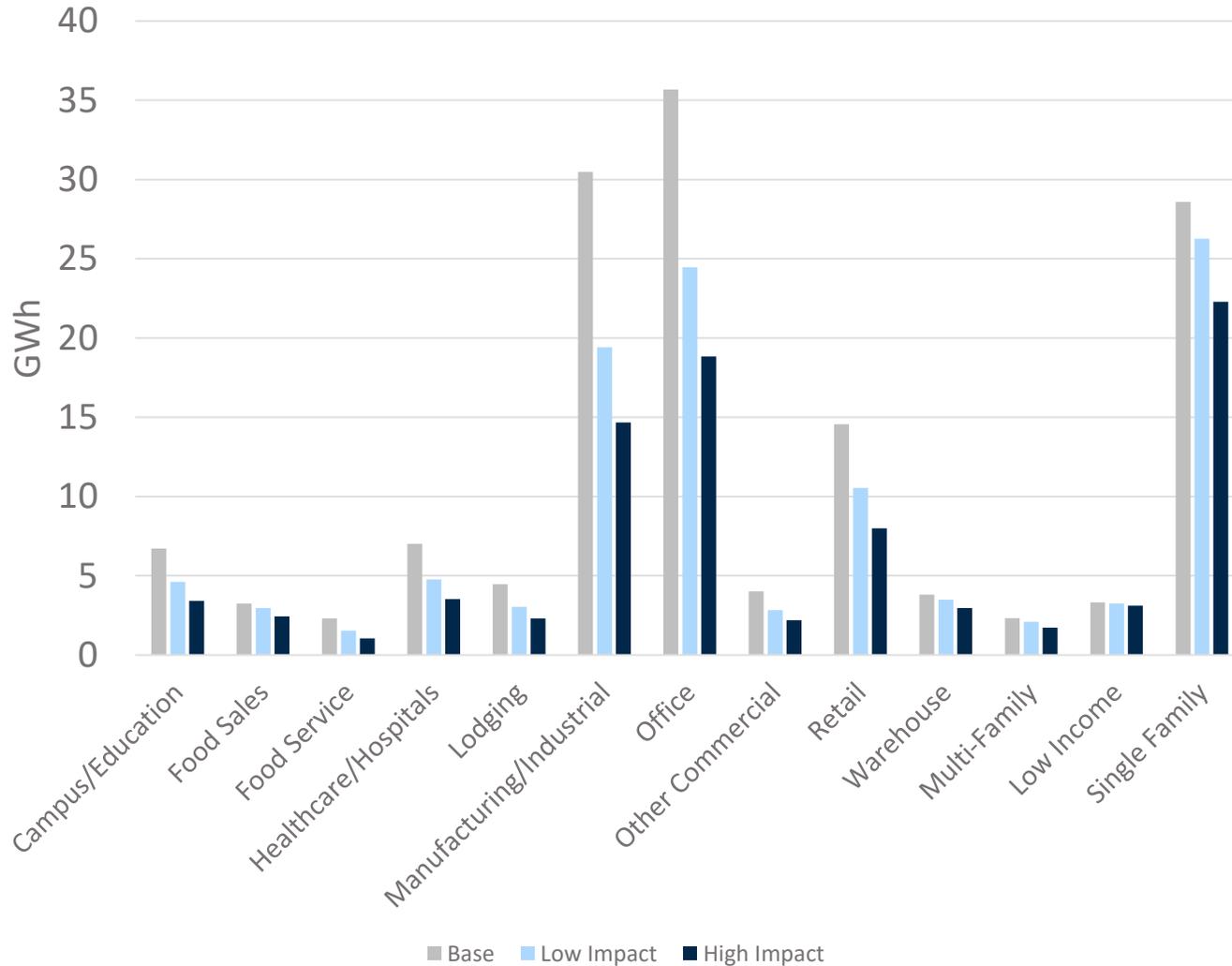
- Assigned non-residential segments to low, moderate, and high categories according to degree of expected effects from COVID
- Assessed two scenarios: a 'low impact on savings' scenario and a 'high impact on savings' scenario, adjusting both market size and barrier level



- Modeled around the Low achievable potential scenario (146 GWh in 2021)
- Savings are reduced by 21% to 41%, depending on the year and scenario

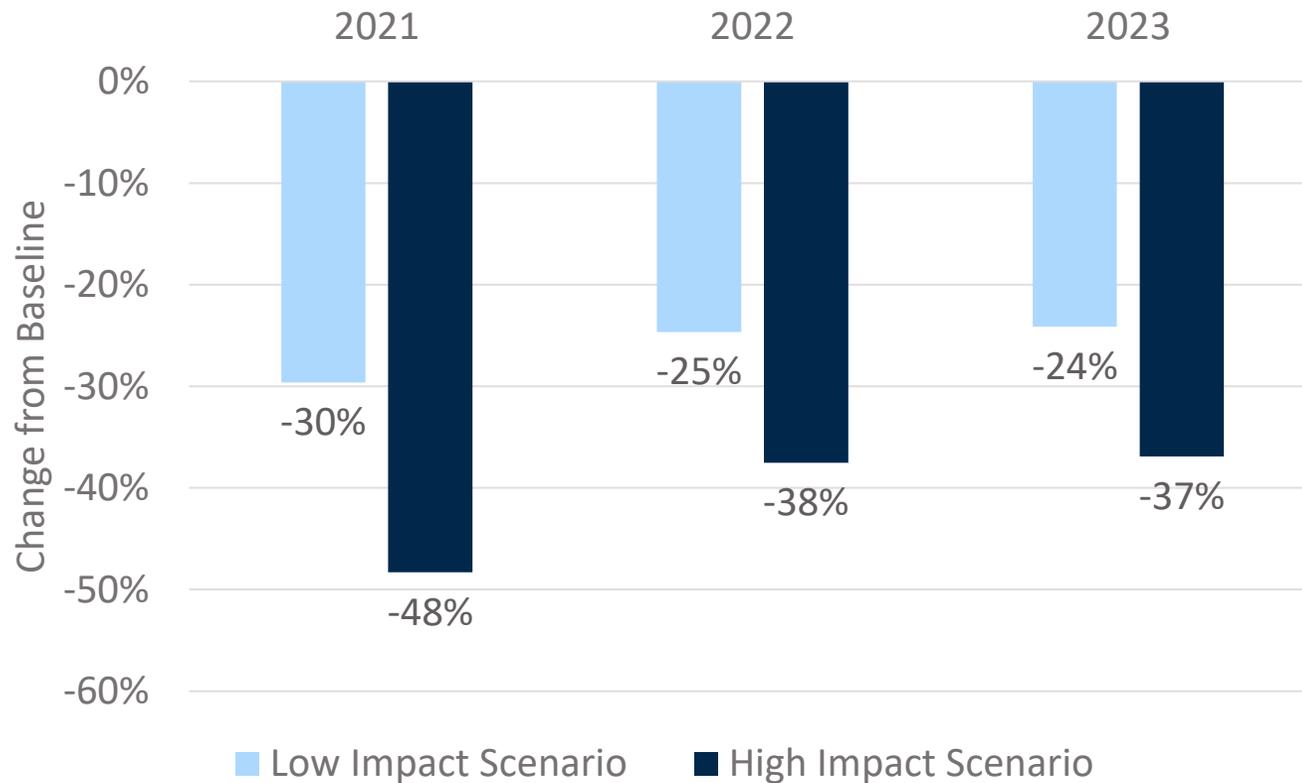
Caveat: Impacts from COVID on market size and barriers to efficiency are unknown. These results demonstrate how savings would be impacted if market size and barrier levels behave as outlined in the scenario settings on the previous slide.

COVID Sensitivity Analysis: 2021 Electric Savings by Segment



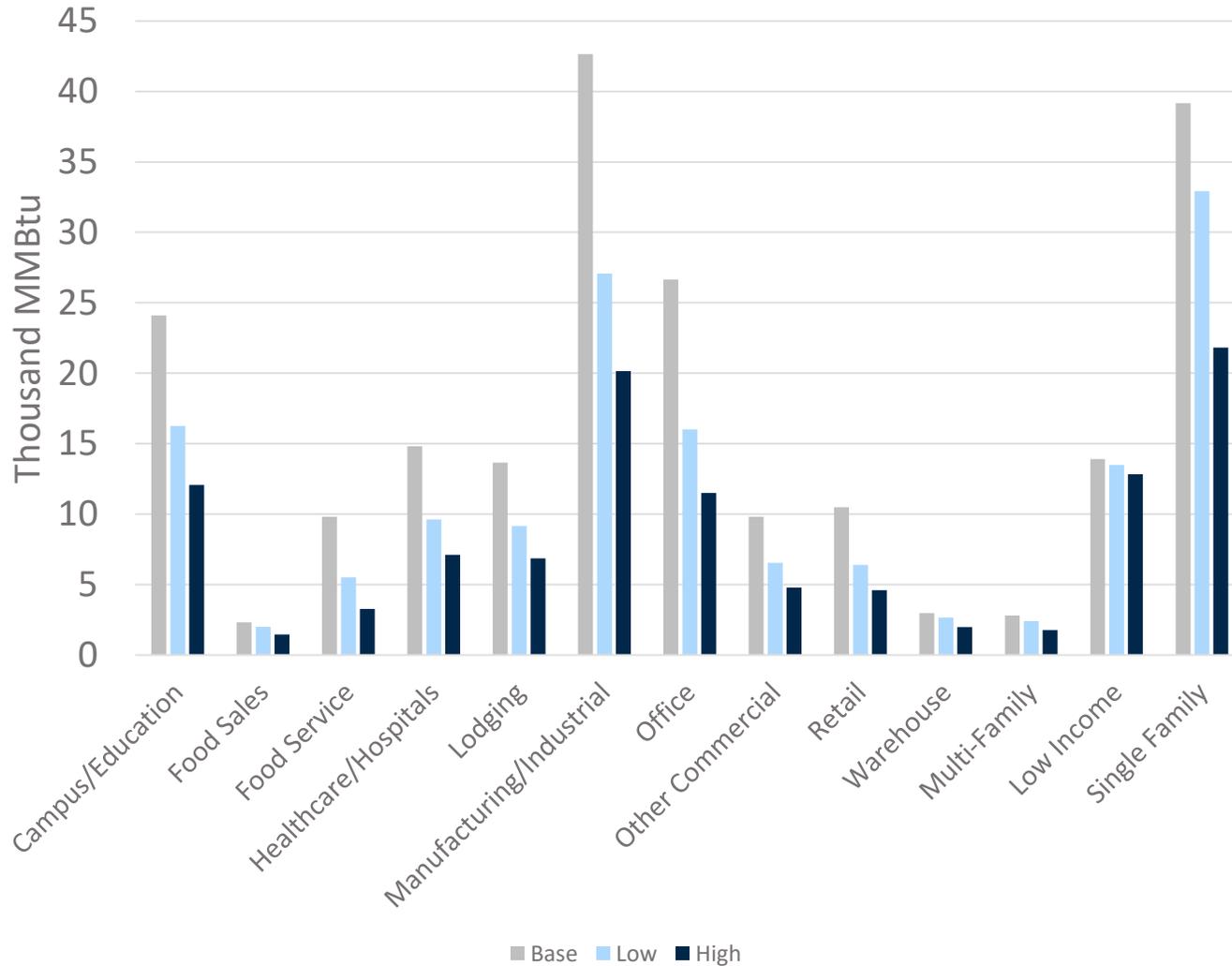
- Largest absolute decreases in savings from Manufacturing/Industrial, Office, Retail, Single Family, and Healthcare/Hospitals given high potential in these segments

COVID Sensitivity Analysis: Natural Gas Savings

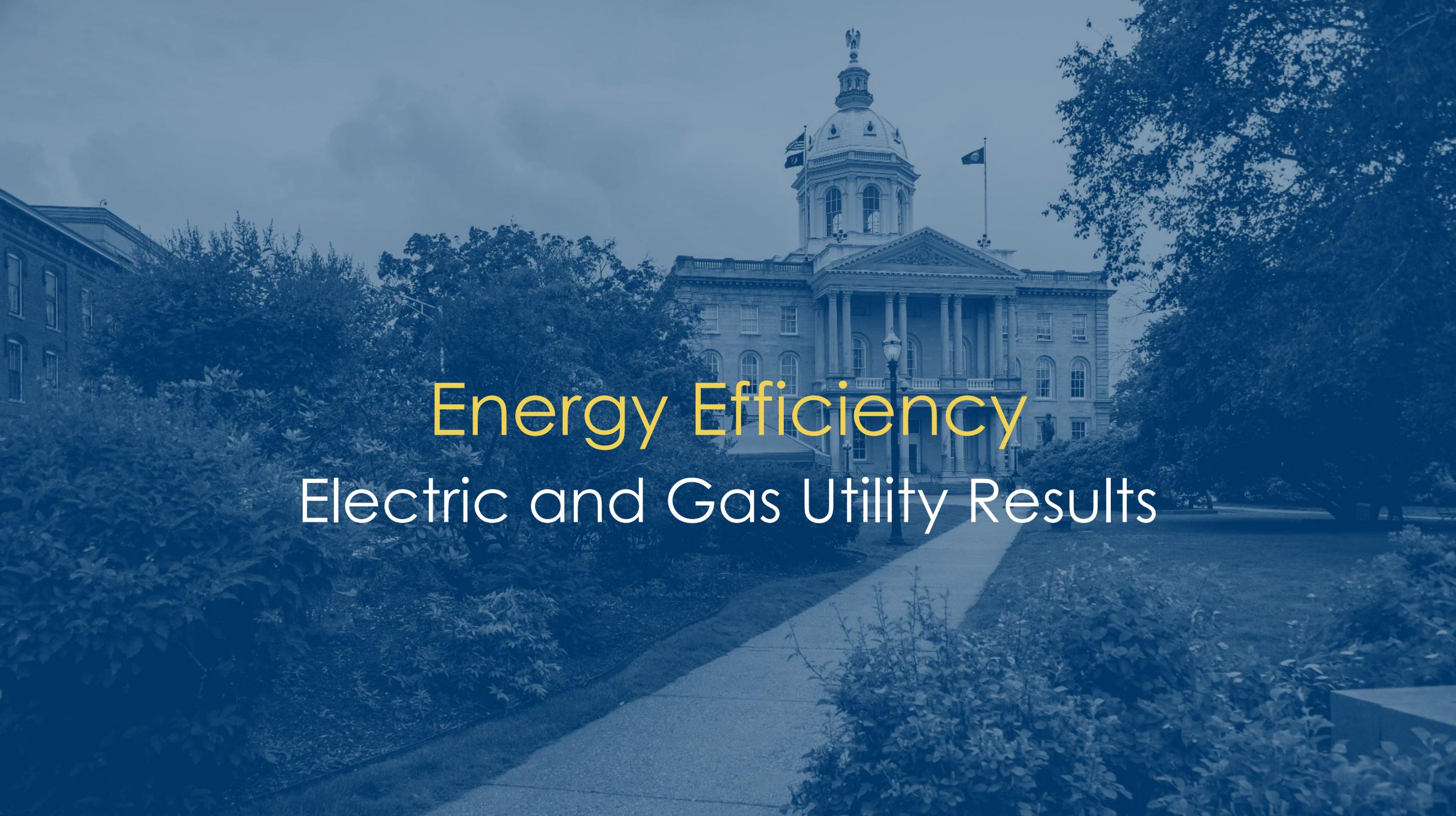


- Again, modeled around the low achievable scenario (201 Thousand MMBtu in 2021)
- Reduction in savings ranging from 24% to 48%

COVID Sensitivity Analysis: Natural Gas Savings



- Largest absolute decreases in savings from Manufacturing/Industrial, Office, Campus/Education, Single Family, and Healthcare/Hospitals given high potential in these segments



Energy Efficiency

Electric and Gas Utility Results

In the following section, the results are primarily presented with respect to the Low scenario, given that it is most in-line with 2021-2023 planned budget and savings

Results Focus	LOW	Incentives and enabling activities at 2018-2020 New Hampshire Statewide Energy Efficiency Plan levels to simulate business as usual
	Mid	Raised incentives to a minimum of 75% and increased enabling activities above and beyond levels within Statewide Energy Efficiency Plan
	Max	Completely eliminates customer costs (100% incentive as portion of incremental costs) while maintaining same level of enabling strategies as Mid

The following sections quantify savings potential by electric and gas program administrators, respectively.

Electric savings presented here represent the electric savings achieved through electric and delivered fuel measures, and do not account for electric savings achieved through natural gas measures due to interactive or secondary savings effects.

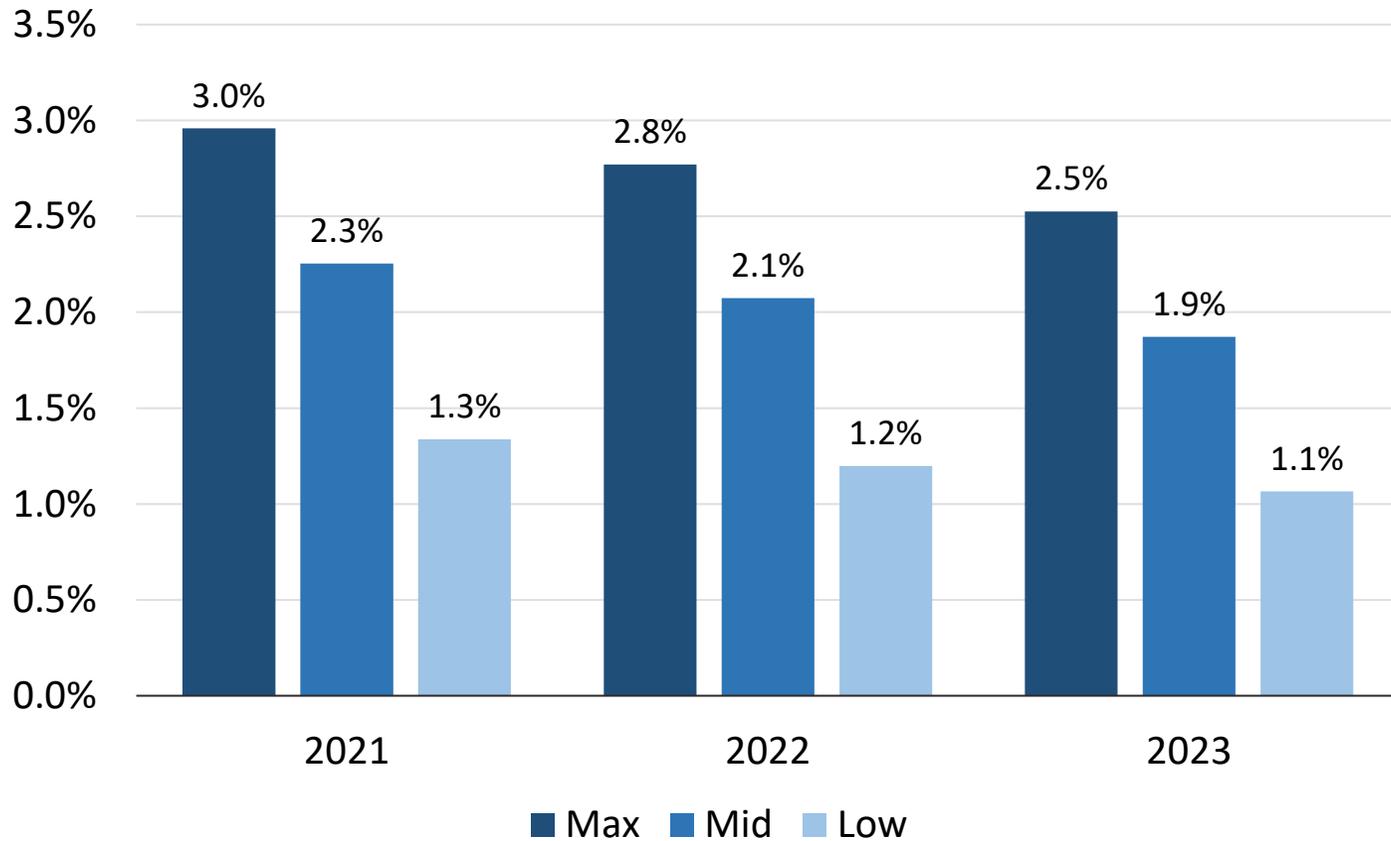
Natural gas savings presented here represent savings achieved through natural gas measures, and don't include natural gas savings from electric or delivered fuel measures.



Energy Efficiency

Electric Utility Results

Electricity Savings as a Percent of Sales

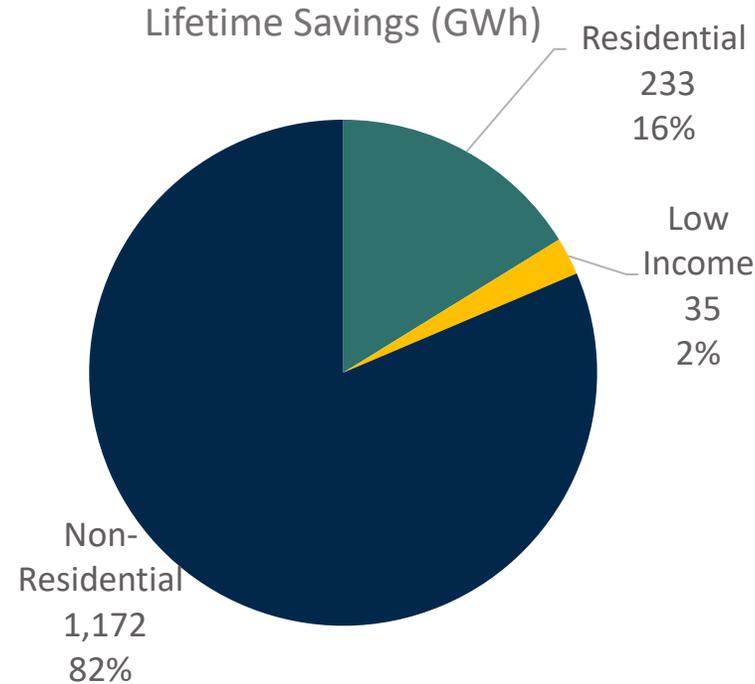
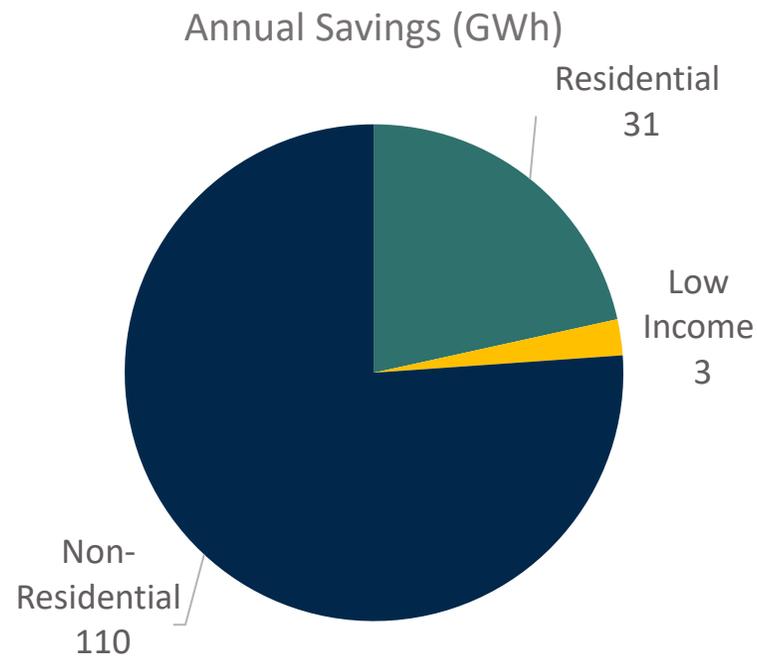


Utility	2021 Target	2022 Target	2023 Target
Eversource	1.22%	1.41%	1.71%
Liberty	1.05%	1.36%	1.67%
NHEC	0.92%	1.03%	0.99%
Unitil	1.18%	1.22%	1.41%

- Current BCR draft shows increased savings targets (and spending) over time

Note: Savings are shown as % of forecasted sales in that year (2021 savings as a percent of 2021 sales). Utility Targets are based on % of 2019 sales.

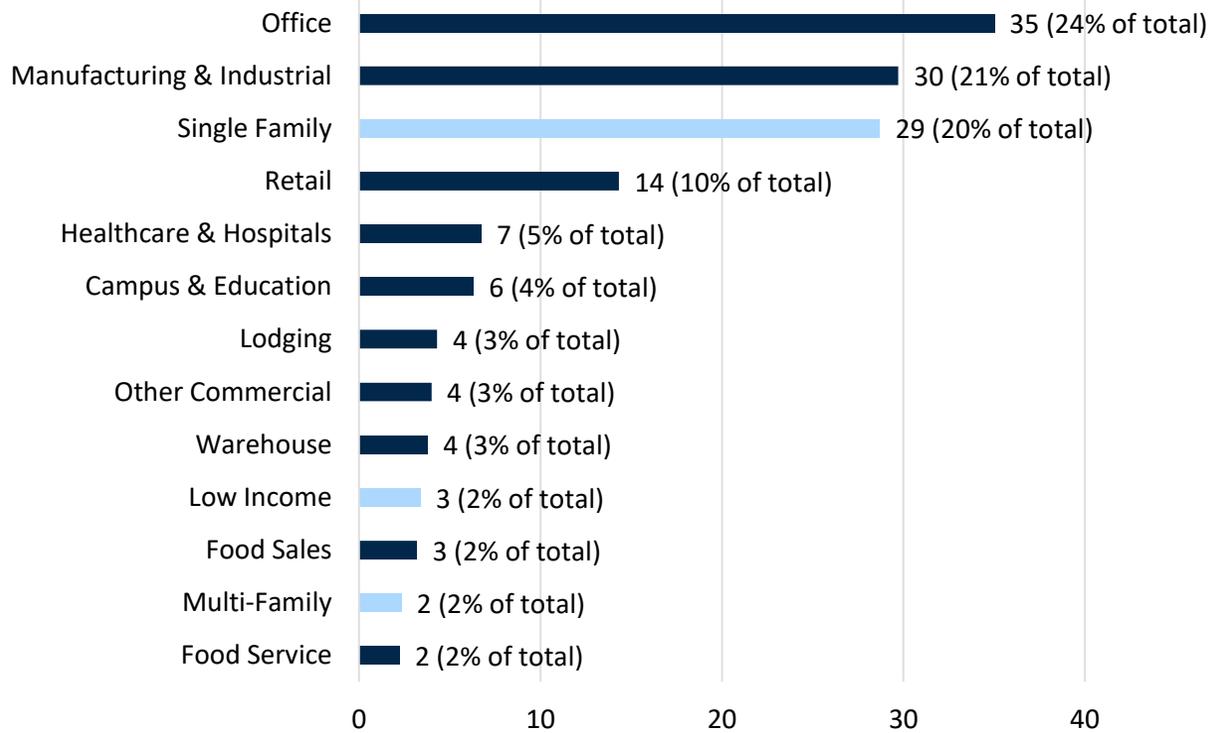
Low Scenario: 2021 Electric Savings by Sector



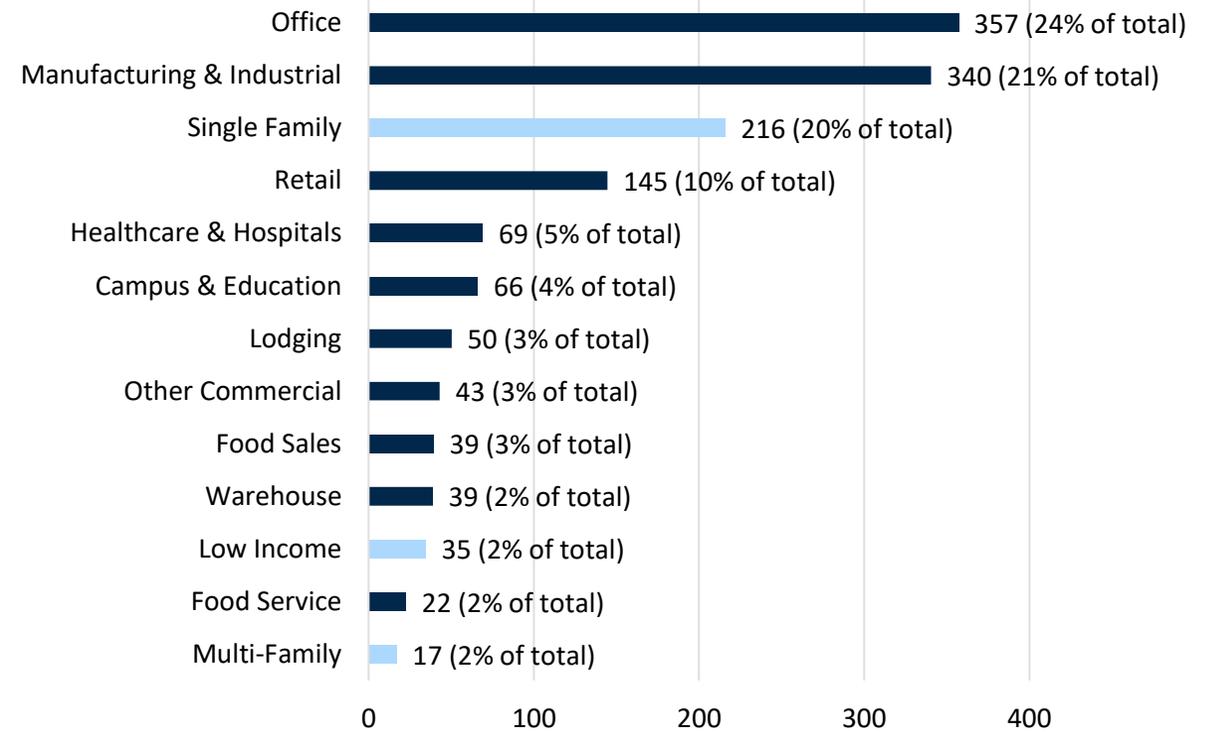
- More than $\frac{3}{4}$ of total annual savings from non-residential sector
- Non-residential represent larger relative share of lifetime savings due to the relative longer average lifetimes of commercial measures (e.g. lower share of measures with short EUL: home energy report, ICH lamps)
- Sector distribution similar to other N-E regions

Low Scenario: 2021 Electric Savings by Segment

Annual Savings (GWh)

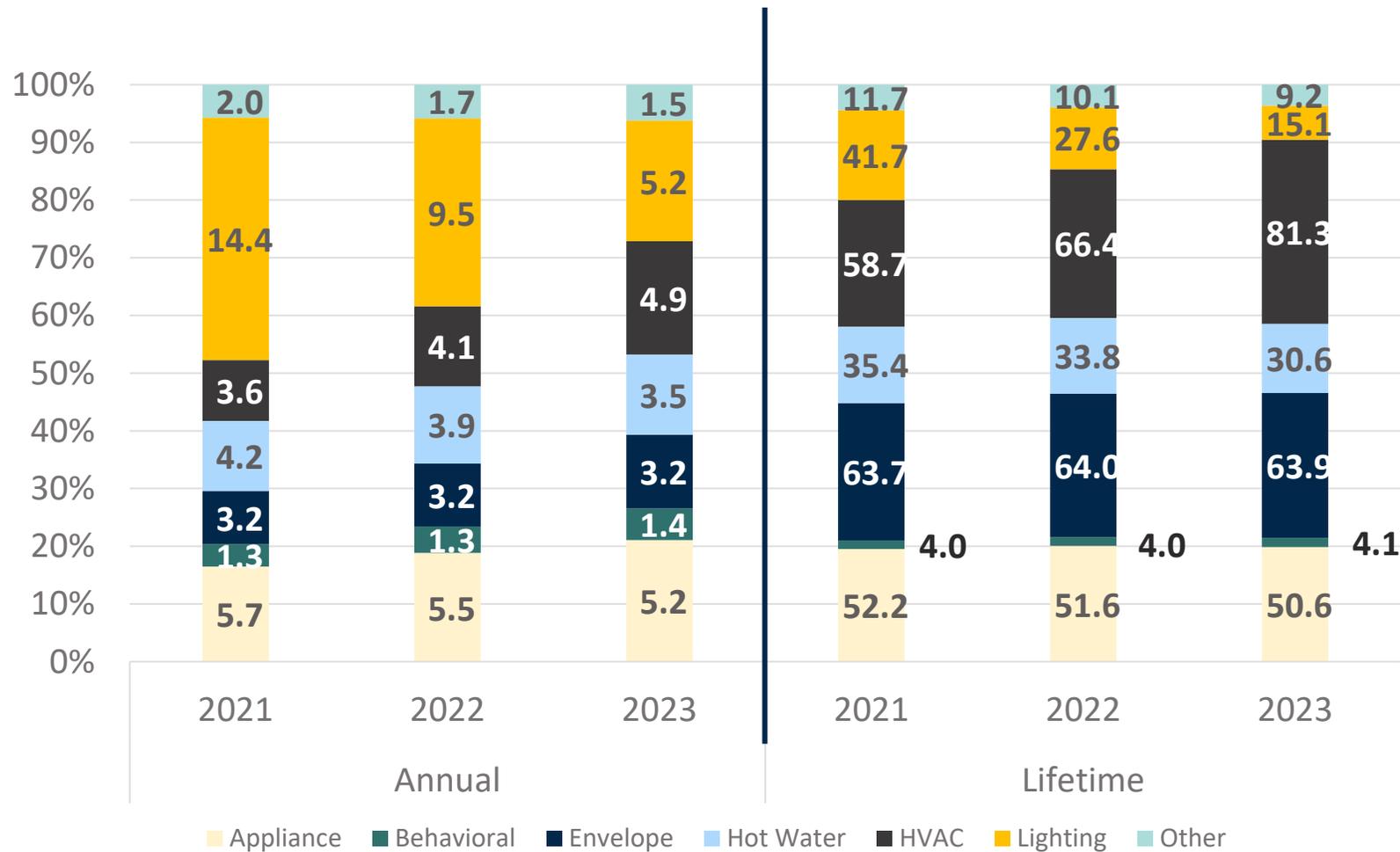


Lifetime Savings (GWh)



Note: Residential: 24% of Annual Savings, 18% of Lifetime Savings

Low Scenario: Evolution of Residential Electric Savings by Measure Class



- Decreasing sector-level annual savings (34 GWh in 2021, 25 GWh in 2023) as LED adoption moves to baseline
- Lifetime savings are more consistent across study years due to measures with long lifetimes (HVAC, envelope)
- Consistent hot water potential throughout study period

Note: 'Other' category includes smart strips, pool pumps

Low Scenario: Residential Electric Savings, Top 10 Measures by Annual Savings

2021	
Measure	GWh
LED A-Lamp (Interior)	8.2
LED Bulbs (exterior)	2.4
LED Specialty - Reflectors (Interior)	2.4
Refrigerator Recycle	1.9
LED Specialty - Candelabras, Globes (Interior)	1.4
Home Energy Report	1.3
Advanced Power Strips	1.2
Thermostatic Restrictor Shower Valve	1.2
Low Flow Shower Head	1.2
Refrigerator	1.1

2022	
Measure	GWh
LED A-Lamp (Interior)	5.4
Refrigerator Recycle	1.7
LED Bulbs (exterior)	1.6
LED Specialty - Reflectors (Interior)	1.6
Home Energy Report	1.3
Advanced Power Strips	1.1
Thermostatic Restrictor Shower Valve	1.1
Low Flow Shower Head	1.1
Refrigerator	1.1
LED Specialty - Candelabras, Globes (Interior)	0.9

2023	
Measure	GWh
LED A-Lamp (Interior)	3.0
Refrigerator Recycle	1.5
Home Energy Report	1.4
Refrigerator	1.1
Advanced Power Strips	0.9
Thermostatic Restrictor Shower Valve	0.9
Low Flow Shower Head	0.9
LED Bulbs (exterior)	0.9
LED Specialty - Reflectors (Interior)	0.9
LED Specialty - Candelabras, Globes (Interior)	0.5

Note: Lighting measures highlighted

Low Scenario: Residential Electric Savings, Top 10 Measures by Lifetime Savings

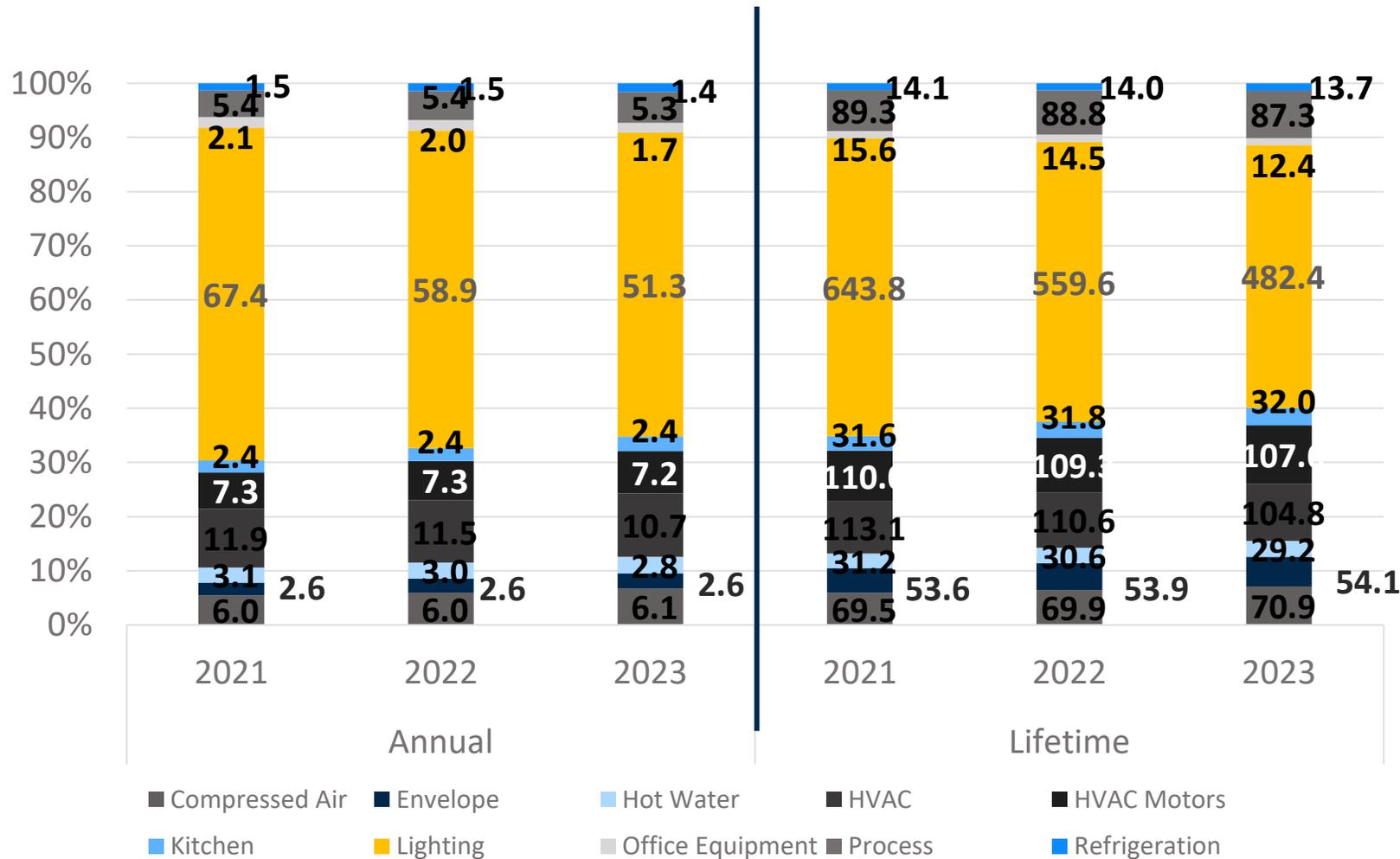
2021	
Measure	GWh
LED A-Lamp (Interior)	24.5
New Home Construction	14.8
Refrigerator	12.7
Water Heater - Heat Pump Water Heater (HPWH)	11.0
Ground Source Heat Pump (GSHP)	10.6
Air Sealing	10.4
Mini-split Ductless Heat Pump (DMSHP)	10.4
Thermostat Wi-Fi	9.9
Insulation - Attic	8.7
Thermostatic Restrictor Shower Valve	8.4

2022	
Measure	GWh
LED A-Lamp (Interior)	24.5
New Home Construction	14.8
Refrigerator	12.7
Water Heater - Heat Pump Water Heater (HPWH)	11.0
Ground Source Heat Pump (GSHP)	10.6
Air Sealing	10.4
Mini-split Ductless Heat Pump (DMSHP)	10.4
Thermostat Wi-Fi	9.9
Insulation - Attic	8.7
Thermostatic Restrictor Shower Valve	8.4

2023	
Measure	GWh
Mini-split Ductless Heat Pump (DMSHP)	31.5
New Home Construction	15.0
Refrigerator	12.9
Ground Source Heat Pump (GSHP)	11.5
Water Heater - Heat Pump Water Heater (HPWH)	11.1
Air Sealing	10.2
Thermostat Wi-Fi	9.9
LED A-Lamp (Interior)	8.8
Insulation - Attic	8.7
Thermostatic Restrictor Shower Valve	6.5

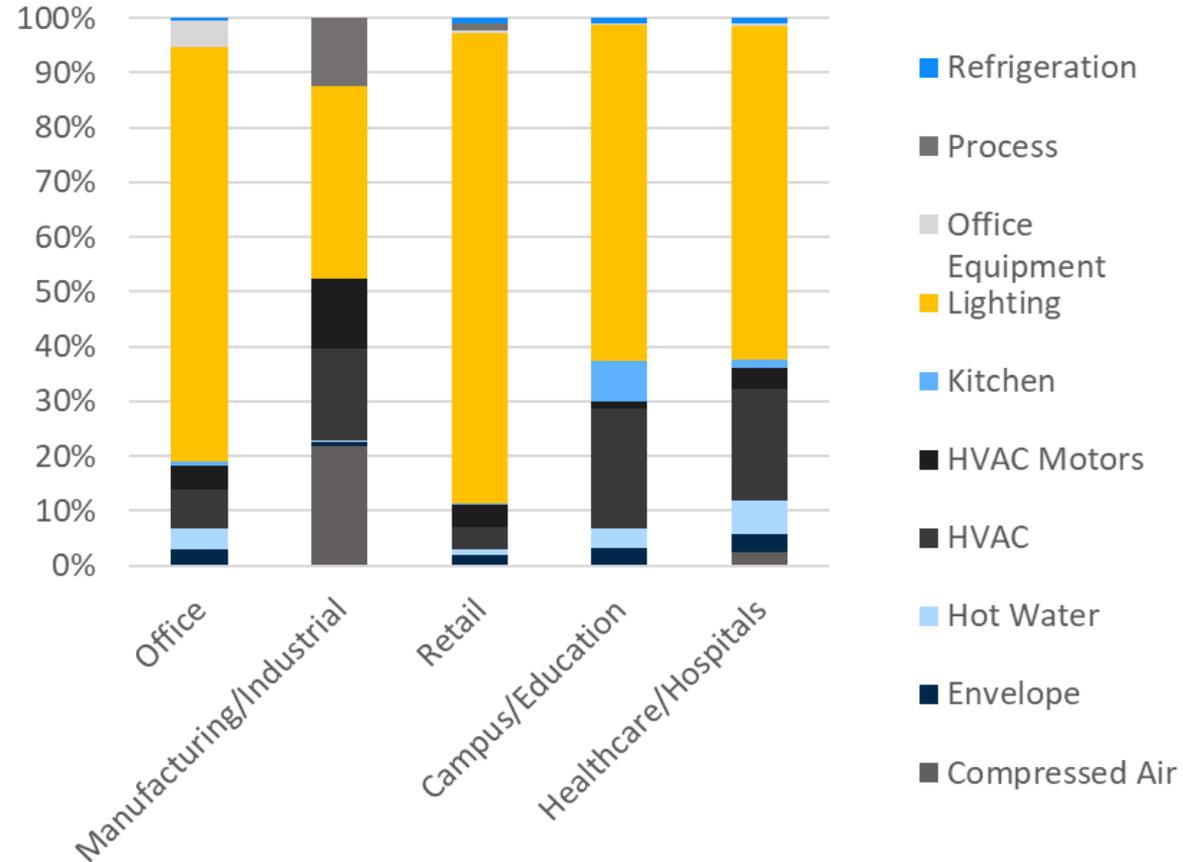
Note: Lighting measures highlighted

Low Scenario: Evolution of Non-Residential Electric Savings by Measure Class



- Declining Lighting Savings due to increased penetration natural adoption of LEDs
- Untapped savings opportunities mostly in Compressed Air

Low Scenario: Non-Residential Electric Savings By Measure Class and Segment, 2021



- Lighting dominates most segments except Manufacturing/Industrial
- Compressed Air and Process Savings concentrated in Manufacturing/Industrial
- Strong HVAC proportion in Institutional Buildings: Campus/Education and Healthcare/Hospitals

Note: Only top 5 segments of sector-level savings are illustrated

Low Scenario: Non-Residential Electric Savings, Top 10 Measures by Annual Savings

2021	
Measure	GWh
LED Linear Tube	18.7
LED Linear Luminaire	18.4
Lighting Controls (Occupancy)	6.8
LED High Bay	6.8
Lighting Controls (Daylighting)	5.6
HVAC VFD - Pump	4.2
Retro-commissioning Strategic Energy Manager (RCx SEM)	3.6
LED Parking Garage (Exterior)	3.0
HVAC VFD - Fan	2.7
Air Receiver for Load/No Load Compressor	2.6

2022	
Measure	GWh
LED Linear Luminaire	16.1
LED Linear Tube	16.1
Lighting Controls (Occupancy)	6.8
Lighting Controls (Daylighting)	5.6
LED High Bay	5.3
HVAC VFD - Pump	4.2
Retro-commissioning Strategic Energy Manager (RCx SEM)	3.4
LED Parking Garage (Exterior)	2.7
HVAC VFD - Fan	2.7
Air Receiver for Load/No Load Compressor	2.6

2023	
Measure	GWh
LED Linear Luminaire	14.1
LED Linear Tube	13.8
Lighting Controls (Occupancy)	6.7
Lighting Controls (Daylighting)	5.5
HVAC VFD - Pump	4.1
LED High Bay	4.0
Retro-commissioning Strategic Energy Manager (RCx SEM)	2.9
HVAC VFD - Fan	2.6
Air Receiver for Load/No Load Compressor	2.6
LED Parking Garage (Exterior)	2.5

Note: Lighting measures highlighted

- Barriers Survey conducted with small non-residential NH customers – self report on site-level LED penetration indicates NH saturation is 2 years behind MA (compared to MA market model penetration)
- Trade Ally survey and interviews corroborate that NH is somewhat behind MA
- Case comparison of MA customers CATI responses vs on-site LED penetration – weak correlation between project size and LED on-site penetration
 - Findings for small non-residential NH customers applicable to non-residential customers of all sizes (NH 2 years behind MA)

Low Scenario: Non-Residential Electric Savings, Top 10 Measures by Lifetime Savings

2021	
Measure	GWh
LED Linear Tube	187.4
LED Linear Luminaire	184.2
LED High Bay	71.5
HVAC VFD - Pump	63.6
Lighting Controls (Occupancy)	54.5
Lighting Controls (Daylighting)	45.0
HVAC VFD - Fan	40.2
Custom Processes	34.0
LED Pole Mounted (Exterior)	31.4
Air Receiver for Load/No Load Compressor	25.6

2022	
Measure	GWh
LED Linear Luminaire	161.5
LED Linear Tube	161.2
HVAC VFD - Pump	63.2
LED High Bay	55.2
Lighting Controls (Occupancy)	54.2
Lighting Controls (Daylighting)	44.6
HVAC VFD - Fan	40.0
Custom Processes	33.8
Air Receiver for Load/No Load Compressor	25.7
LED Pole Mounted (Exterior)	25.4

2023	
Measure	GWh
LED Linear Luminaire	140.5
LED Linear Tube	137.7
HVAC VFD - Pump	62.1
Lighting Controls (Occupancy)	53.5
Lighting Controls (Daylighting)	44.0
LED High Bay	42.3
HVAC VFD - Fan	39.5
Custom Processes	33.3
Air Receiver for Load/No Load Compressor	26.0
LED Pole Mounted (Exterior)	20.4

Note: Lighting measures highlighted

1. Expand Program Offering

- **Domestic hot water:** Water-saving devices demonstrate potential and can be offered through direct install, retail programs or mail-order kits.
- **Appliances:** Current programs only capture a small fraction of the available market. Opportunities to grow the refrigerator replacement market as well as the refrigerator recycling program.
- **Other:** Advanced power strips have demonstrated robust savings in several jurisdictions. Potential delivery path through retail programs and/or direct install.

2. Increase Incentives and Address Barriers

- Residential Electric Savings can grow 45% between the low and mid scenario.
- New program strategies can reduce barrier to participation (such as Liberty's AIM program).

1. Expand Specific Program Offer

The following measures are eligible through the retrofit program. Specific program tracks or prescriptive offers could increase participation to the following measures:

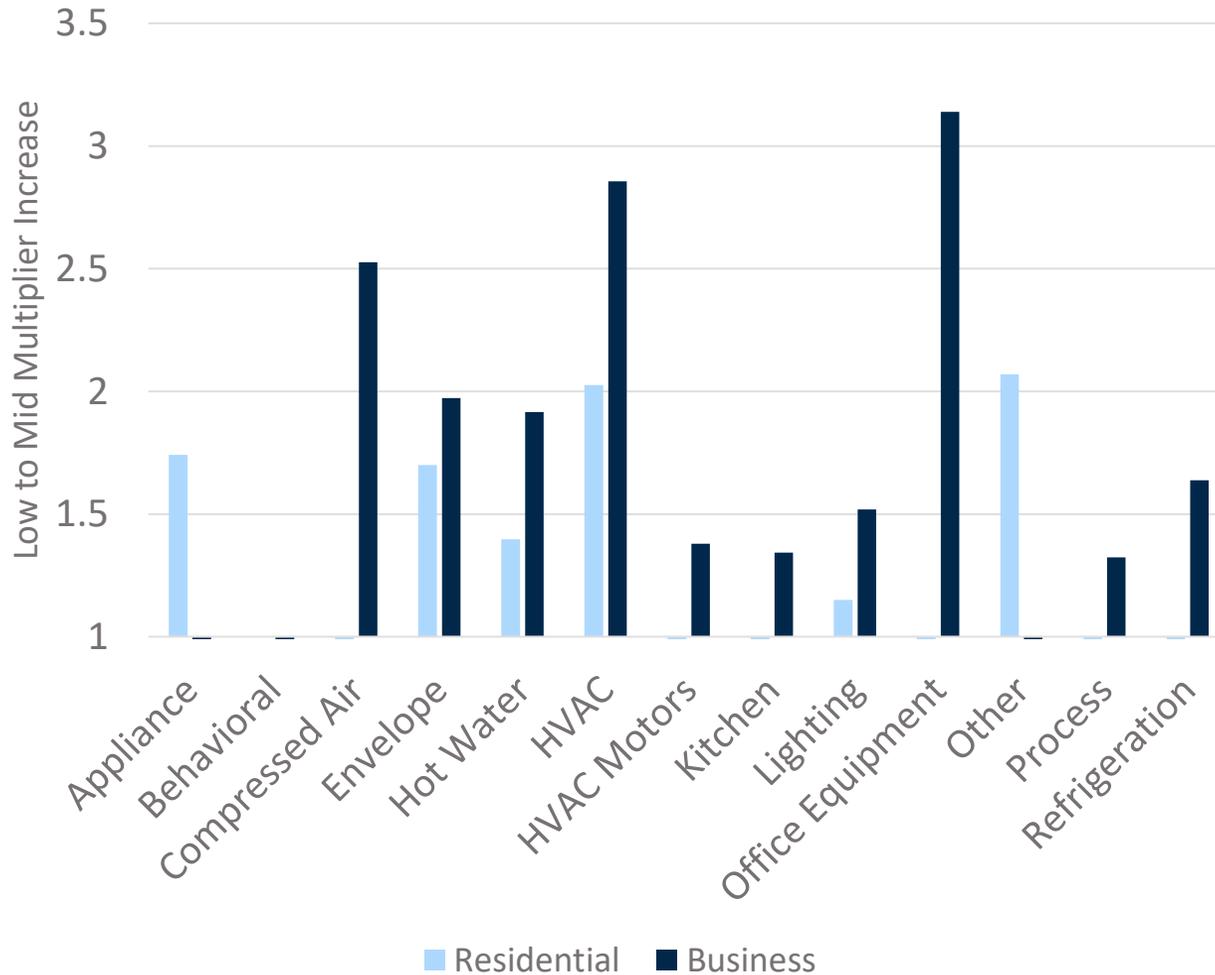
- **Energy Management:** Control devices and building management practices represent strong growth opportunities in NH and elsewhere. Strong program offering to support these can unlock this potential.
- **Compressed Air:** Within the industrial/manufacturing segment, compressed air equipment holds a strong potential for new opportunities
- **Hot water:** The analysis indicates a good potential for water-saving devices. This is strongly related to basic assumption on the saturation of electric water heating equipment in the C&I sector. Additional research would be required to confirm these numbers.
- **Motors & Drives:** Variable Frequency Drives offer strong potential

2. Increase Incentives and address barriers

- Commercial Electric Savings can grow 75% between the low and mid scenario
- New program strategies can reduce barrier to participation (such as expansion of the mid-stream program).

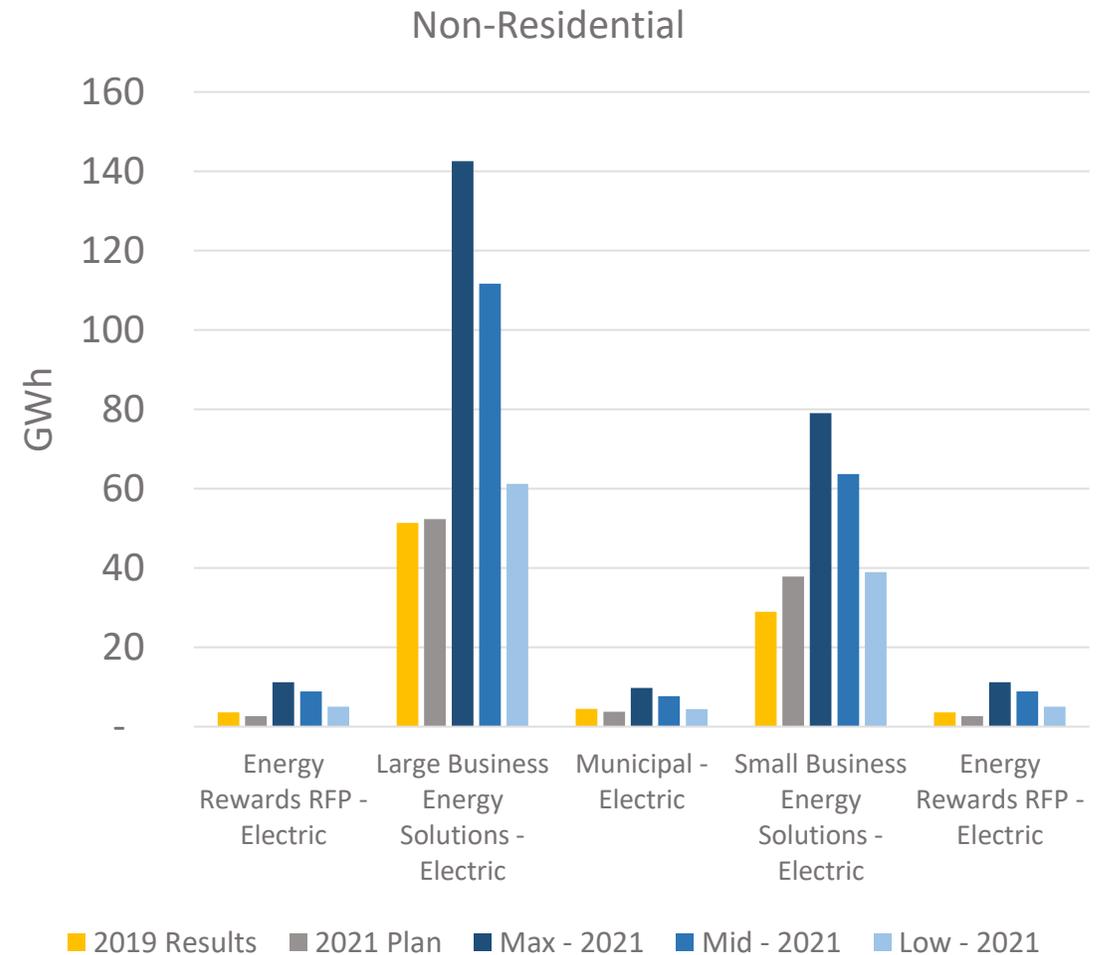
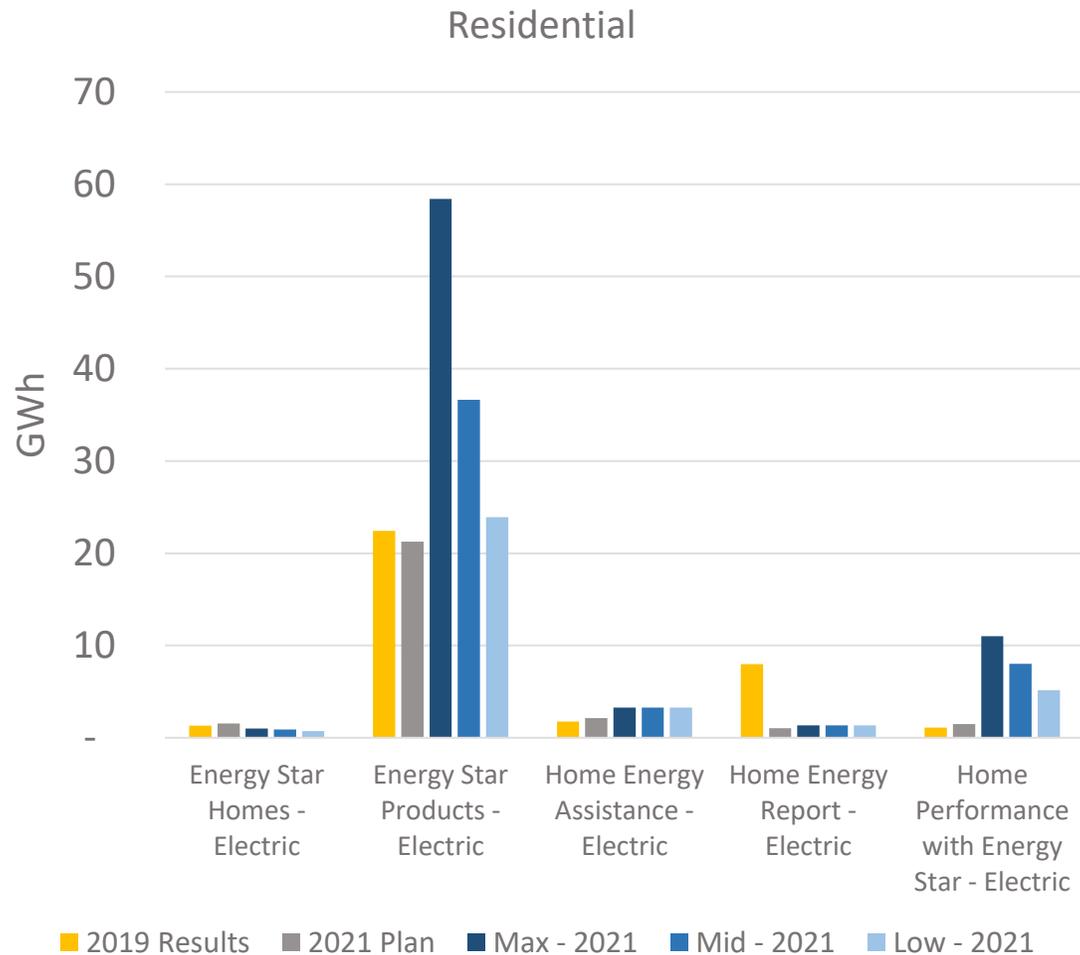
Electric Programs: Mid Scenario vs. Low Scenario

Savings by Measure Class



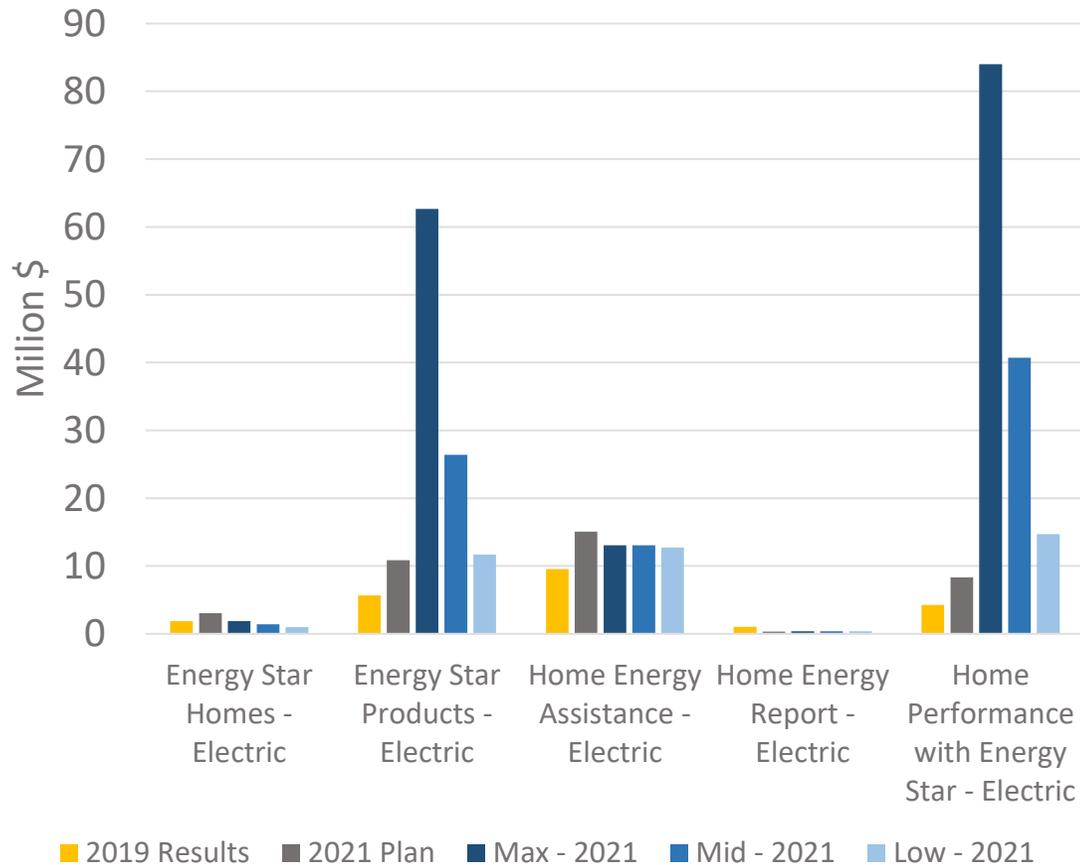
- This graph shows relative increase in savings between the Low and Mid scenarios (showing which measure class are most sensitive to incentives and enabling strategies)
- Residential:
 - Other (smart strips)
 - HVAC
 - Appliance
 - Envelope
- Non-Residential
 - Office equipment
 - HVAC
 - Compressed air
 - Envelope
 - Hot water

Electric Utility Program Savings

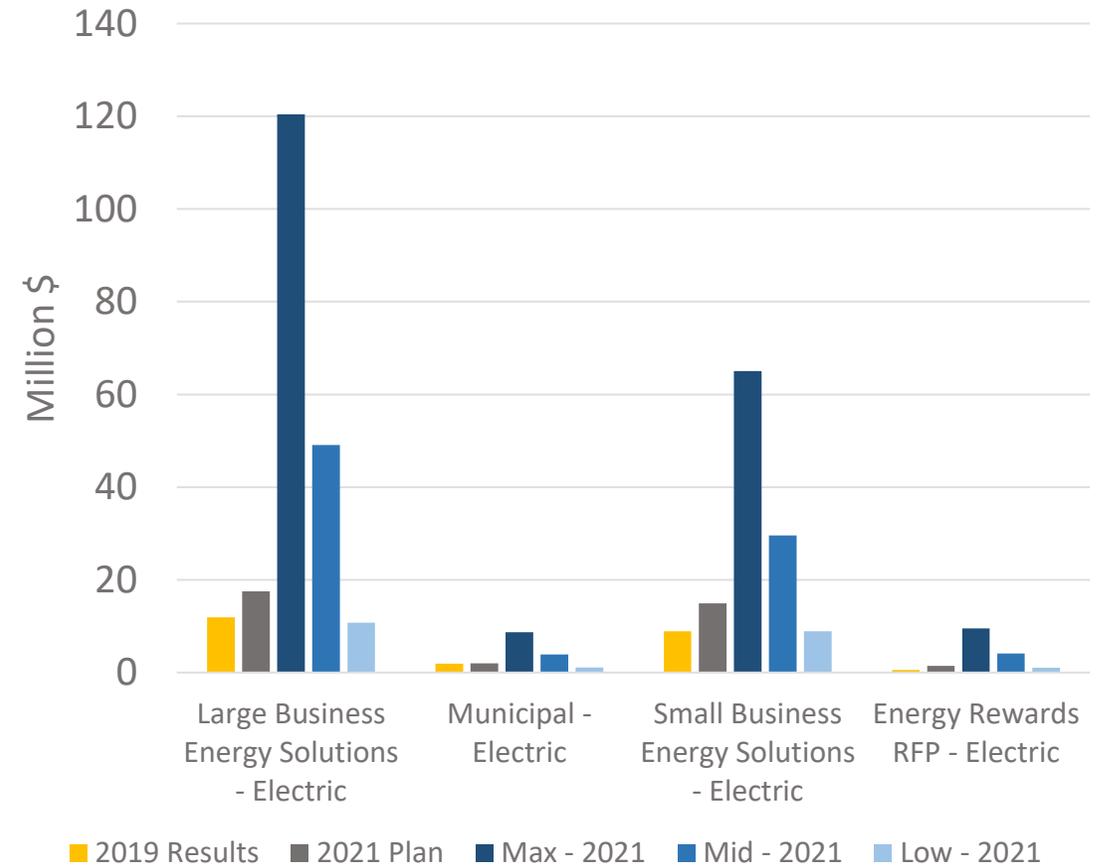


Electric Utility Program Spending

Residential



Non-Residential



Electric Utility Program Cost-Effectiveness



Residential				
Energy Star Homes - Electric	4.12	5.97	7.08	8.27
Energy Star Products - Electric	1.65	1.52	2.19	2.79
Home Energy Assistance - Electric	1.70	2.90	2.90	2.98
Home Energy Report - Electric	#N/A	1.37	1.37	1.37
Home Performance with Energy Star - Electric	3.07	1.67	2.34	3.62
Non-Residential				
Energy Rewards RFP - Electric	#N/A	1.24	2.34	5.40
Large Business Energy Solutions - Electric	3.93	1.24	2.45	6.46
Municipal - Electric	3.47	1.19	2.14	4.56
Small Business Energy Solutions - Electric	3.18	1.31	2.34	4.88

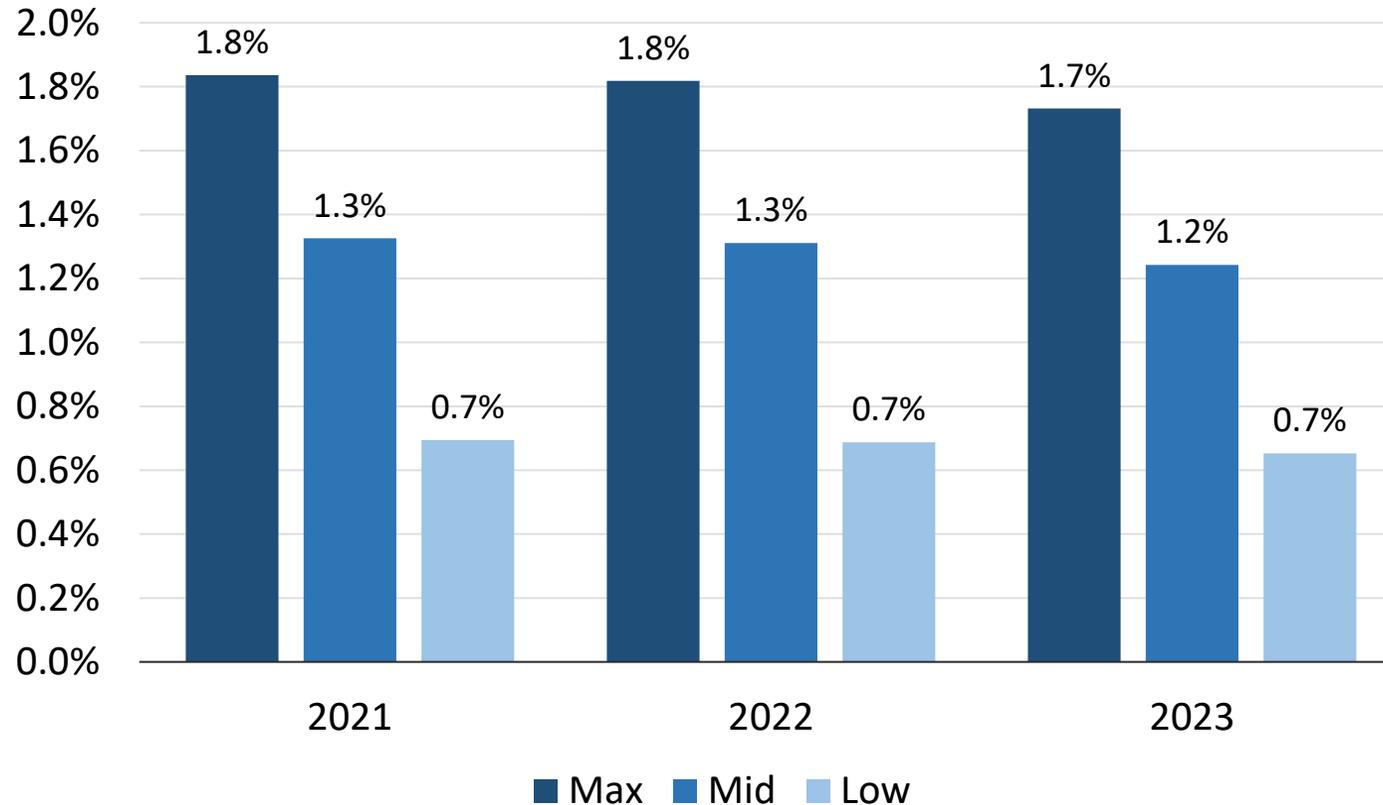
- Higher modeled cost-effectiveness for residential programs primarily driven by lower incentive level under BAU
- Higher modeled cost-effectiveness for large business primarily driven by new opportunities in Manufacturing/Industrial with high cost-effectiveness (compressed air)



Energy Efficiency

Gas Utility Results

Gas Savings as a Percent of Sales

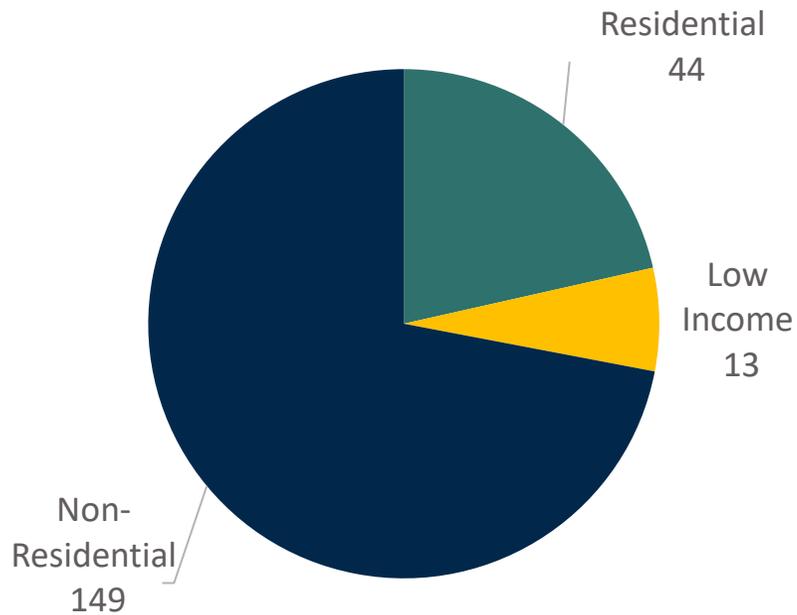


Utility	2021 Target	2022 Target	2023 Target
Liberty	0.88%	1.04%	1.14%
Unitil	0.57%	0.74%	0.85%

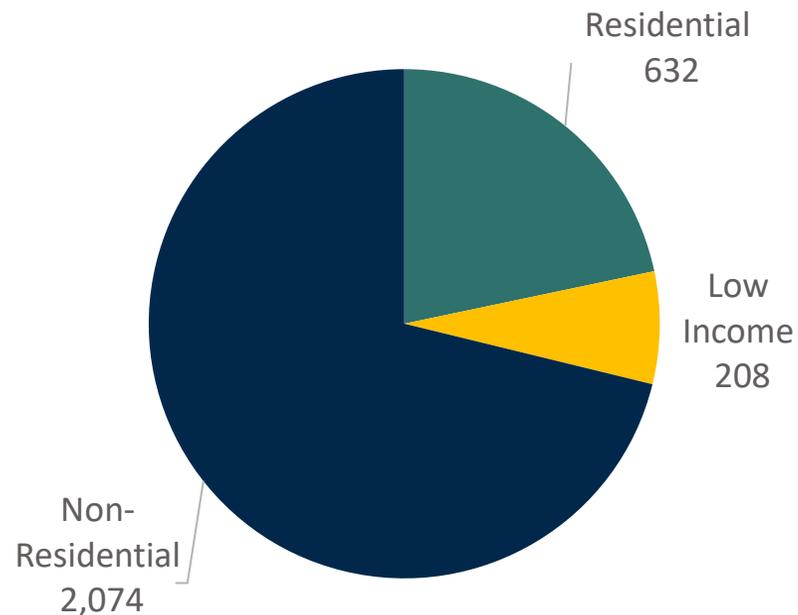
Note: Savings are shown as % of forecasted sales in that year (2021 savings as a percent of 2021 sales). Utility Targets are based on % of 2019 sales.

Low Scenario: 2021 Gas Savings by Sector

Annual Savings (Thousand MMBtu)



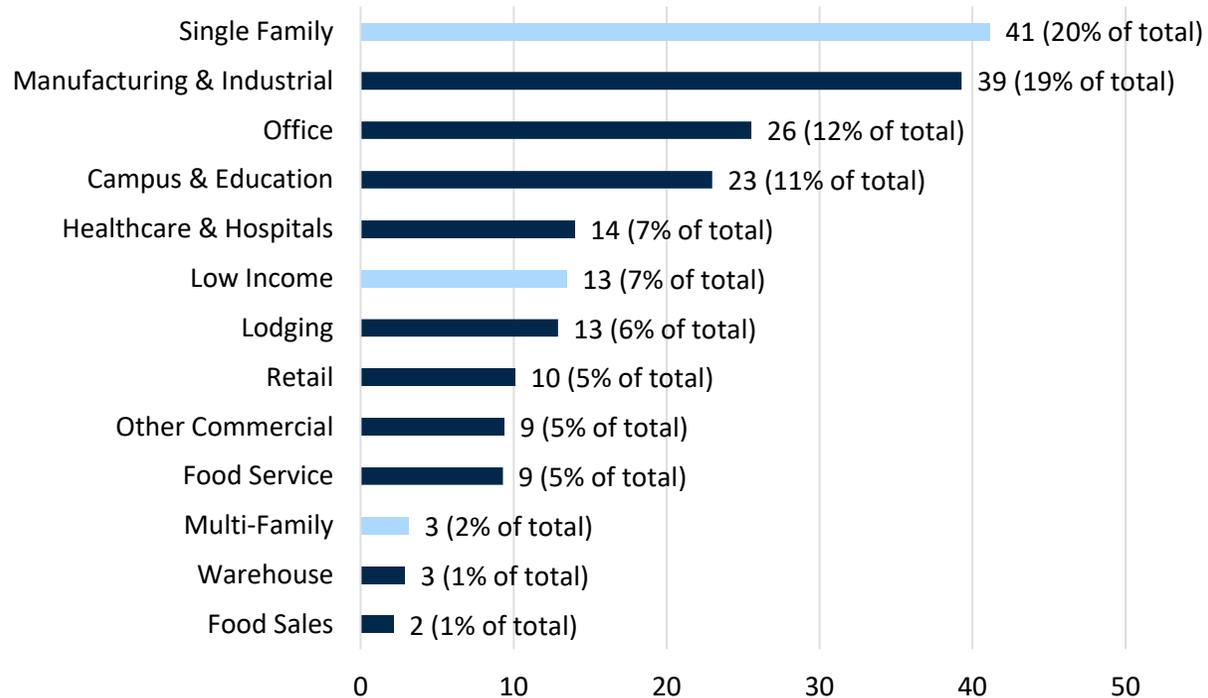
Lifetime Savings (Thousand MMBtu)



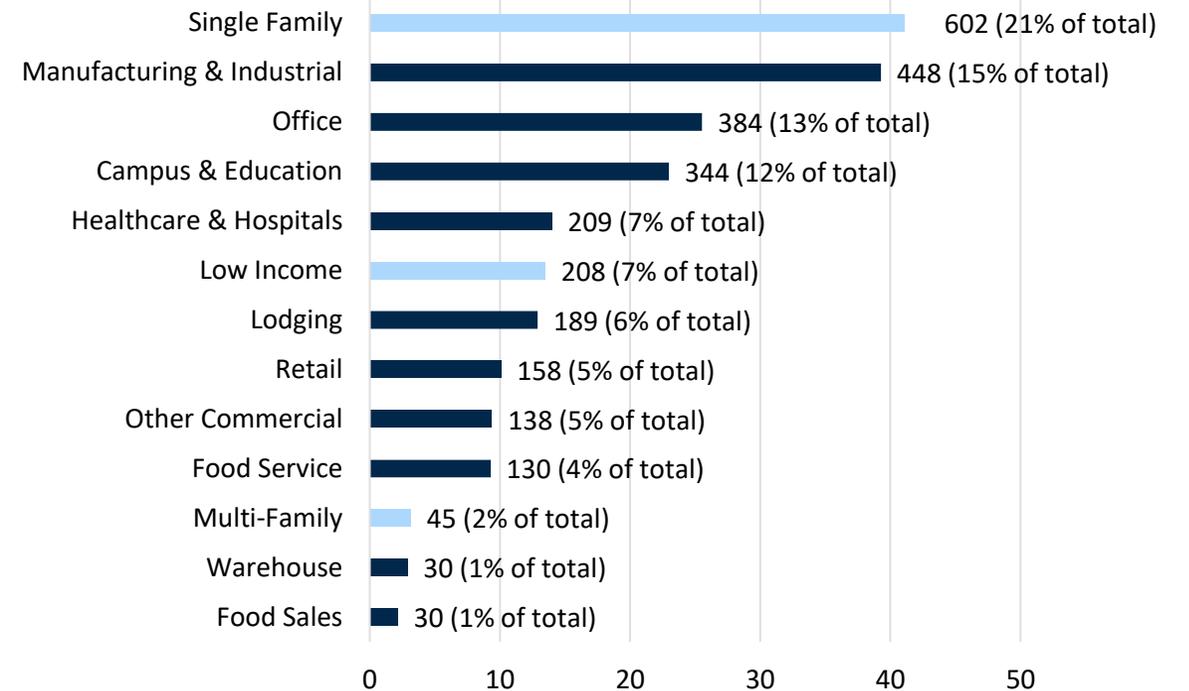
- Increased share of residential savings on a lifetime basis due to prevalence of envelope measures

Low Scenario: 2021 Gas Savings by Segment

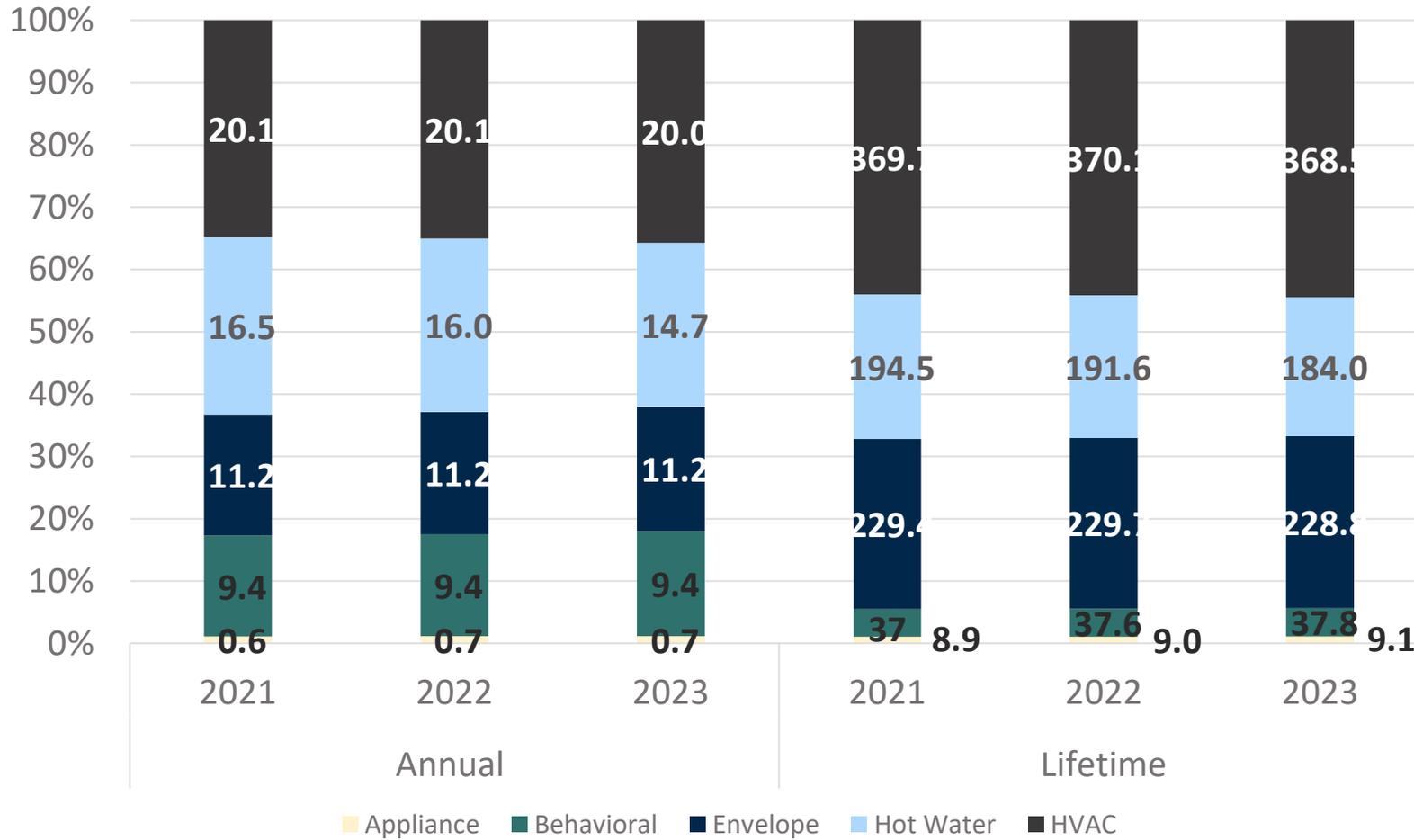
Annual Savings (Thousand MMBtu)



Lifetime Savings (Thousand MMBtu)



Low Scenario: Evolution of Residential Gas Savings by Measure Class



Note: Savings in '000 MMBTU

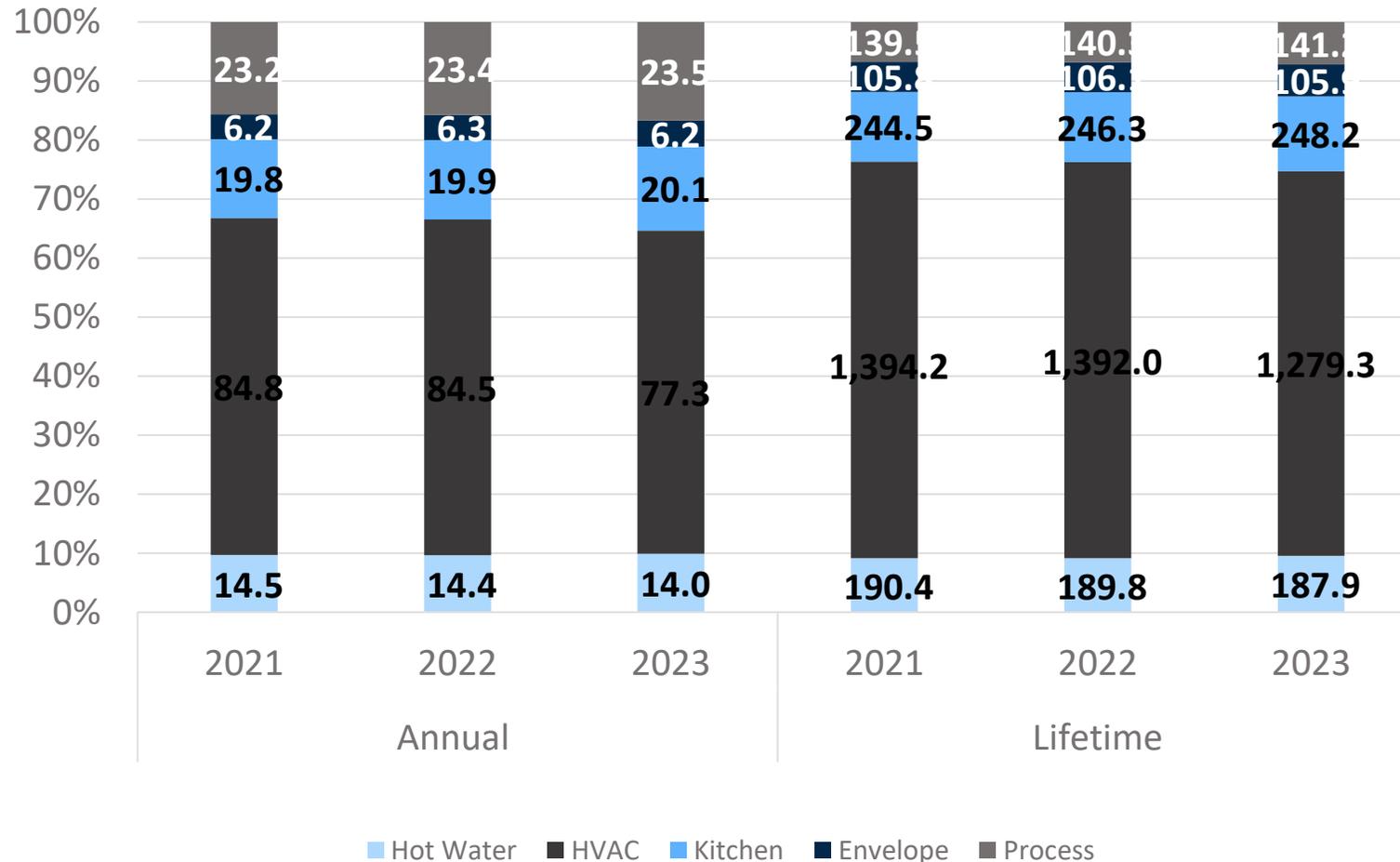
- Consistent savings throughout the study period
- Significant additional opportunities in Hot Water

Low Scenario: Residential Gas Savings, 2021 Top 10 Measures

Annual	
Measure	2021
Home Energy Report	9.4
Furnace	8.8
Water Heater - Tankless	4.3
Duct Insulation	3.9
Water Heater - Storage	3.6
Thermostatic Restrictor Shower Valve	3.1
Insulation - Attic	2.9
Low Flow Shower Head	2.9
Thermostat Wi-Fi	2.9
New Home Construction	2.8

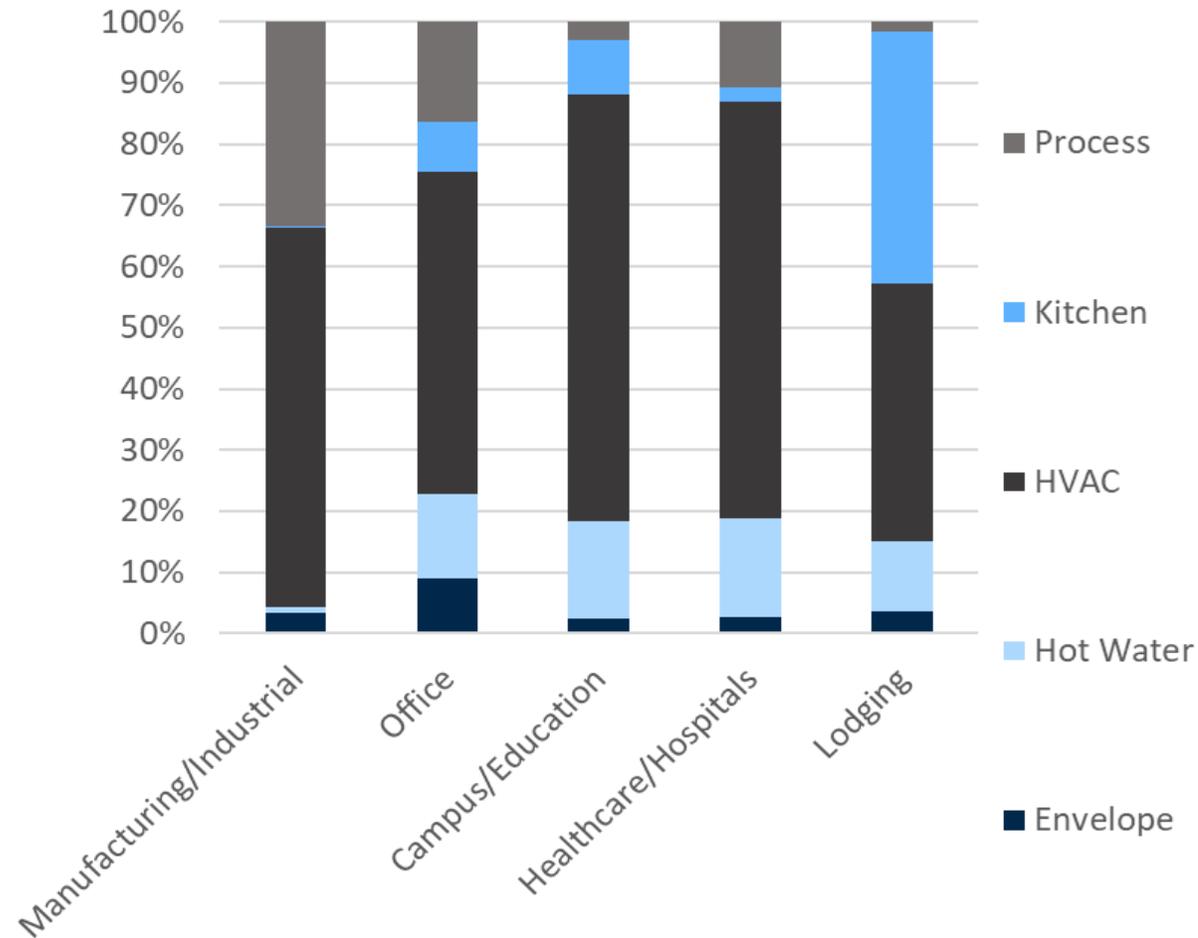
Lifetime	
Measure	2021
Furnace	157.8
New Home Construction	93.2
Water Heater - Tankless	86.4
Duct Insulation	77.3
Insulation - Attic	57.9
Boiler	55.6
Water Heater - Storage	47.4
Thermostat Wi-Fi	43.2
Insulation - Wall	31.6
Air Sealing	28.0

Low Scenario: Evolution of Non-Residential Gas Savings by Measure Class



- Savings dominated by HVAC
- Opportunities in Kitchen equipments

Low Scenario: Non-Residential Gas Savings By Measure Class and Segment



- Process related savings concentrated in Manufacturing / Industrial
- Hot water savings in other segments
- Kitchen Equipment Opportunities in the Lodging segment

Note: Only top 5 segments of sector-level savings are illustrated

Low Scenario: Non-Residential Gas Savings, 2021 Top 10 Measures

Annual	
Measure	2021
Steam Trap	22.2
Boiler	18.8
Waste Heat Recovery	11.9
Boiler Reset Control	10.0
Condensing Make Up Air Unit	9.5
Fresh Air controlled by CO2 monitors	8.8
Fryer	8.9
Volume Water Heater	7.8
Furnace	6.8
Kitchen Demand Control Ventilation	6.1

Lifetime	
Measure	2021
Boiler	366.9
Boiler Reset Control	203.4
Condensing Make Up Air Unit	199.7
Waste Heat Recovery	179.9
Steam Trap	139.9
Volume Water Heater	118.8
Furnace	115.8
Fryer	104.7
Kitchen Demand Control Ventilation	99.8
Fresh Air controlled by CO2 monitors	88.8

1. Expand Program Offering

- **Domestic hot water:** Water savings devices demonstrates potential and can be offered through direct install, retail programs or mail-order kits.

2. Increase Incentives and Address Barriers

- Residential Natural Gas Savings can grow 88% between the low and mid scenario.
- New program strategies can reduce barrier to participation (such as Liberty's AIM program).

1. Expand Specific Program Offer

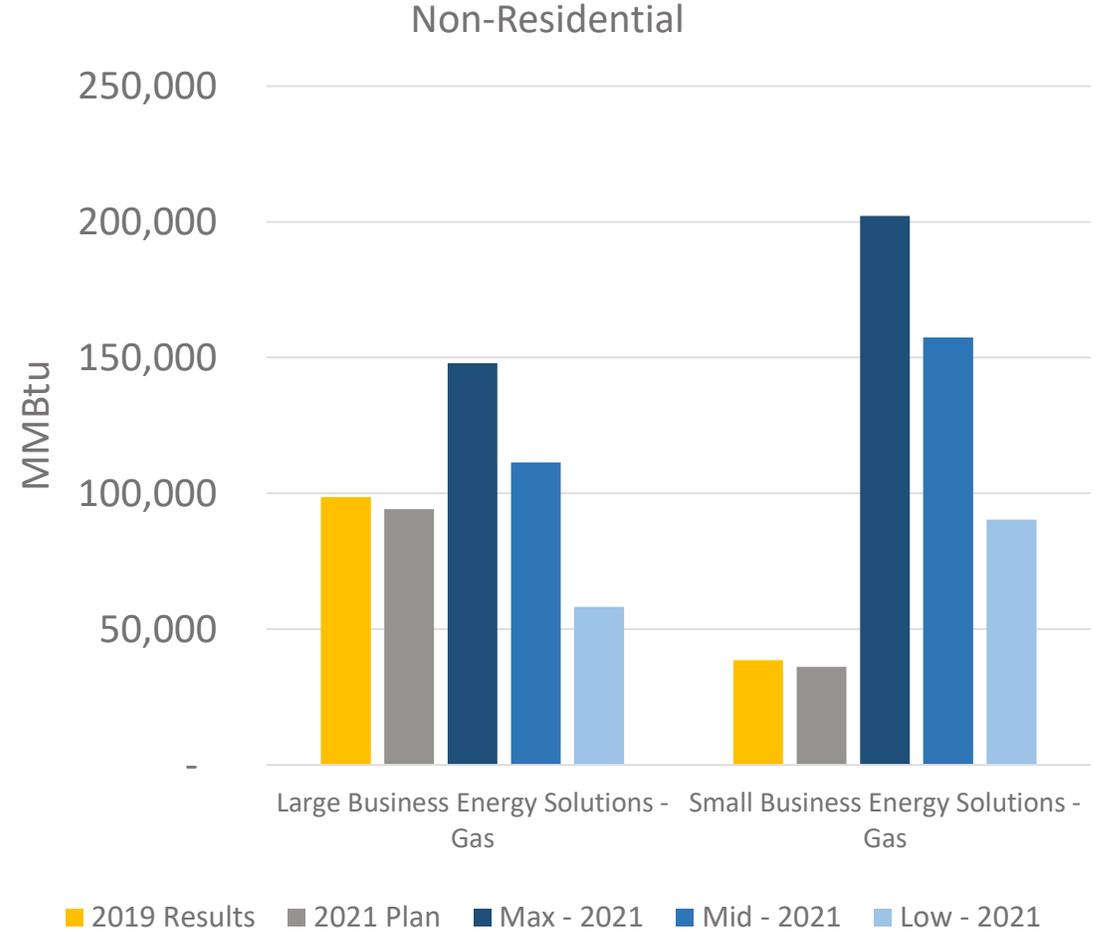
The following measures are eligible through the retrofit program. Specific program tracks or prescriptive offers could increase participation to the following measures:

- **Domestic hot water:** The analysis indicates a good potential for water savings devices. This is strongly related to basic assumption on the saturation of electric DHW in the C&I sector. Additional research would be required to confirm these numbers
- **Energy Management:** Control devices and building management practices represent strong growth opportunities in NH as elsewhere. Strong program offering to support these can unlock this potential.
- **Commercial Kitchen Appliances:** These equipment represent a good growth opportunity, although face significant market barriers due. Current incentives seem lower than BAU assumptions.

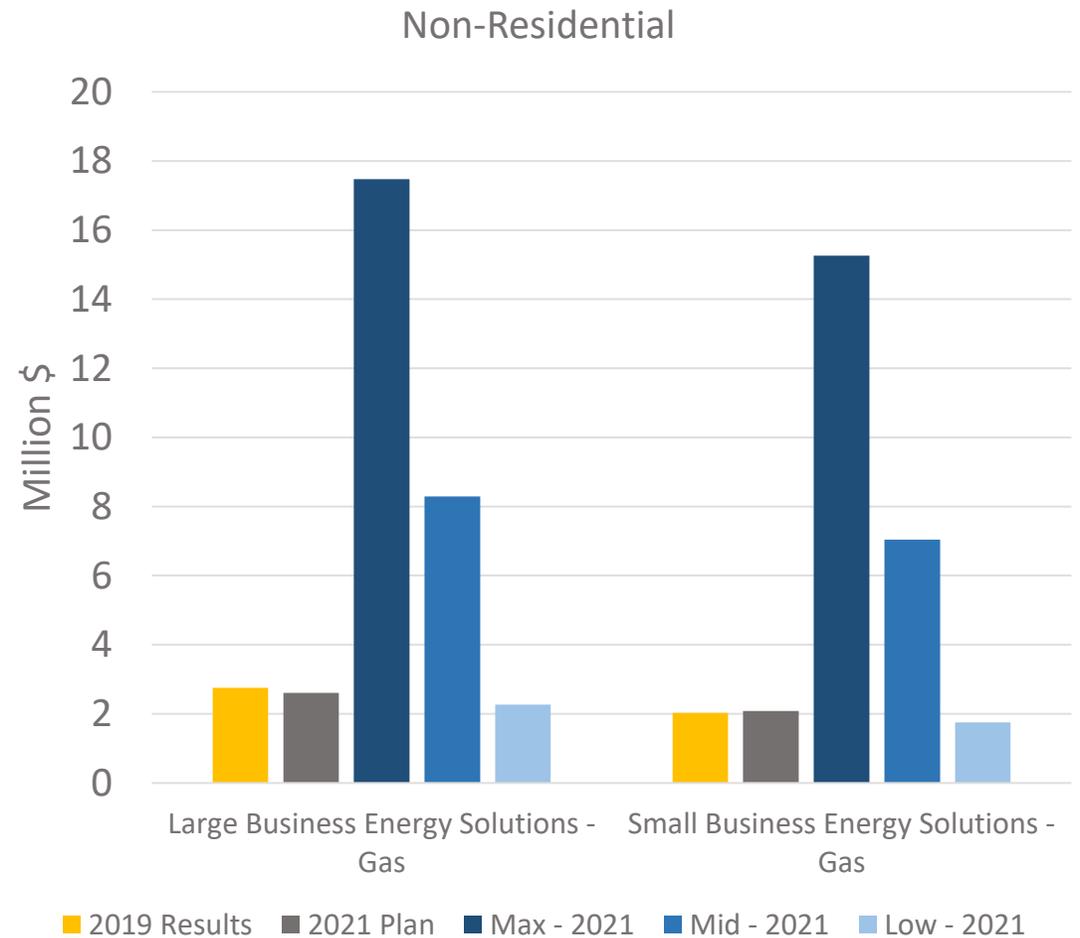
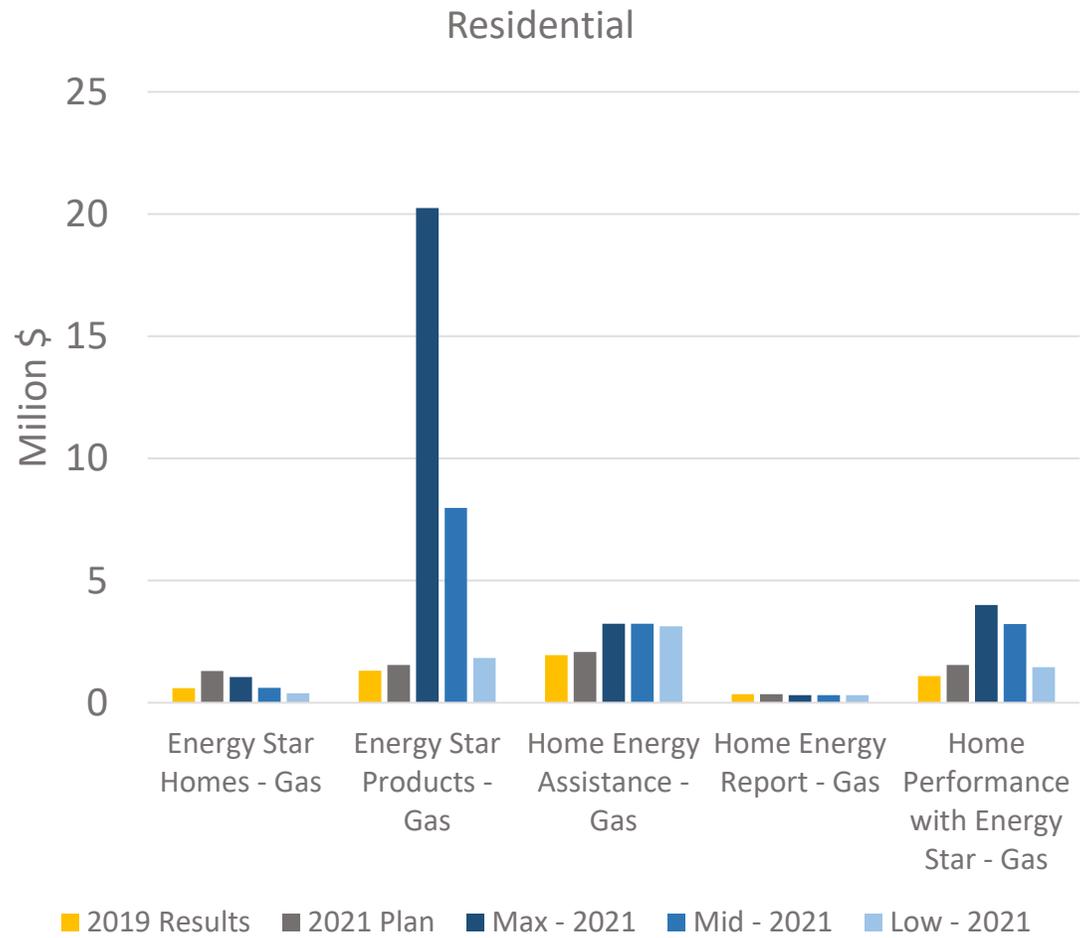
2. Increase Incentives and address barriers

- Commercial Electric Savings can grow 81% between the low and mid scenario
- New program strategies can reduce barrier to participation.

Gas Utility Program Saving



Gas Utility Program Spending



Gas Utility Program Cost-Effectiveness

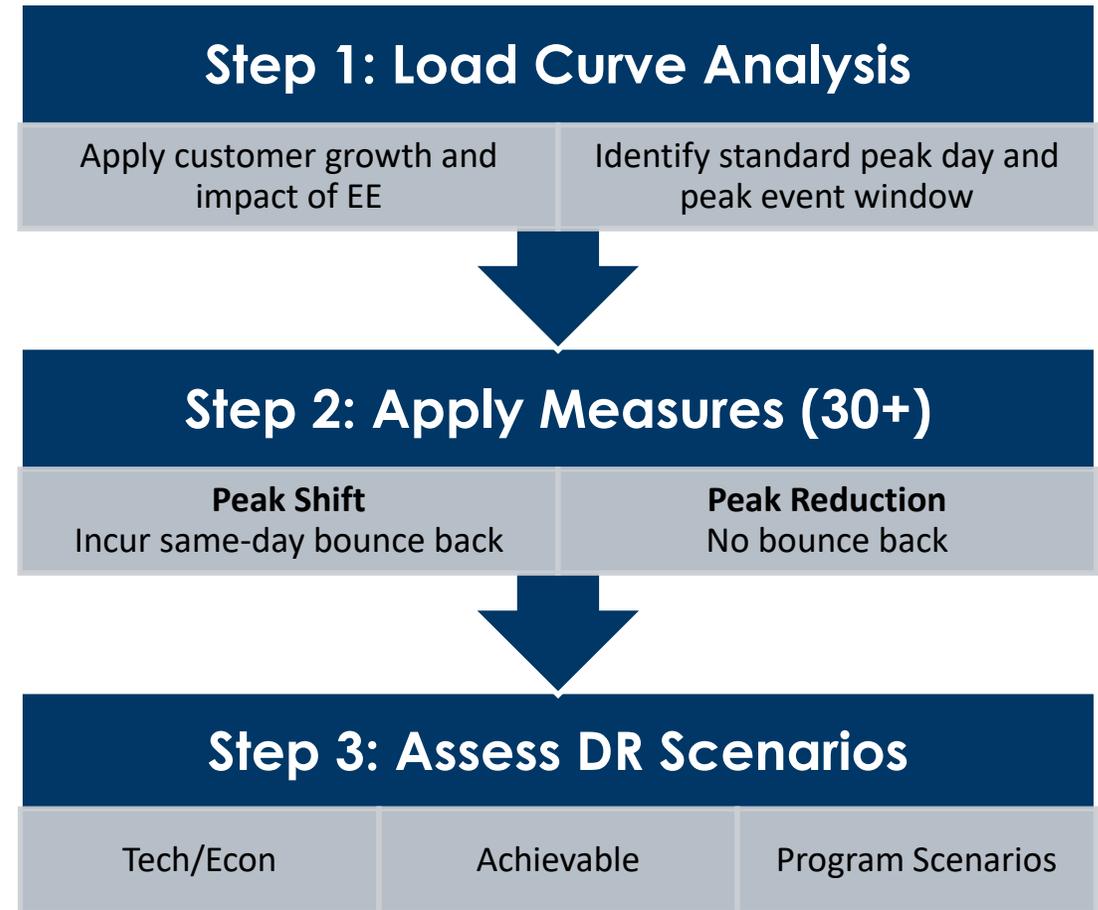
Residential				
Energy Star Homes - Gas	1.76	1.38	1.66	1.83
Energy Star Products - Gas	2.12	0.87	1.20	1.69
Home Energy Assistance - Gas	1.29	0.73	0.73	0.76
Home Energy Report - Gas	#N/A	1.14	1.14	1.14
Non-Residential				
Large Business Energy Solutions - Gas	4.17	1.51	2.47	5.08
Small Business Energy Solutions - Gas	2.64	1.31	2.16	4.55

- Higher modeled cost-effectiveness for large business primarily driven by stronger penetration of highly cost-effective measures (boiler reset control, CO2 control on fresh air, water savings devices).



Active Demand

- **Modelled potential in each year (2021-2023)**
 - Impact is assessed against ISO-NE load curve, peak hours
 - Demand from all utilities are combined in a state-wide peak load assessment
 - Granite State Test results account for 9-year expected persistence (EUL) with 3-year contract cycle (participant attrition and new recruitment)
 - The most cost-effective measures given priority ranking
 - Applied DLC measures in Small Businesses, similar to Residential DLC measures.
- **Applied program ramp-up**
 - Accounted for measure adoption and new programs 2021-2023



Three program scenarios are explored in this study:

BASECASE

LOW

Current DR programs and incentives, expanded to full market*

Mid

Expanded DR programs with mid-point incentives (relative to maximum and benchmarked to other jurisdictions)

MAX

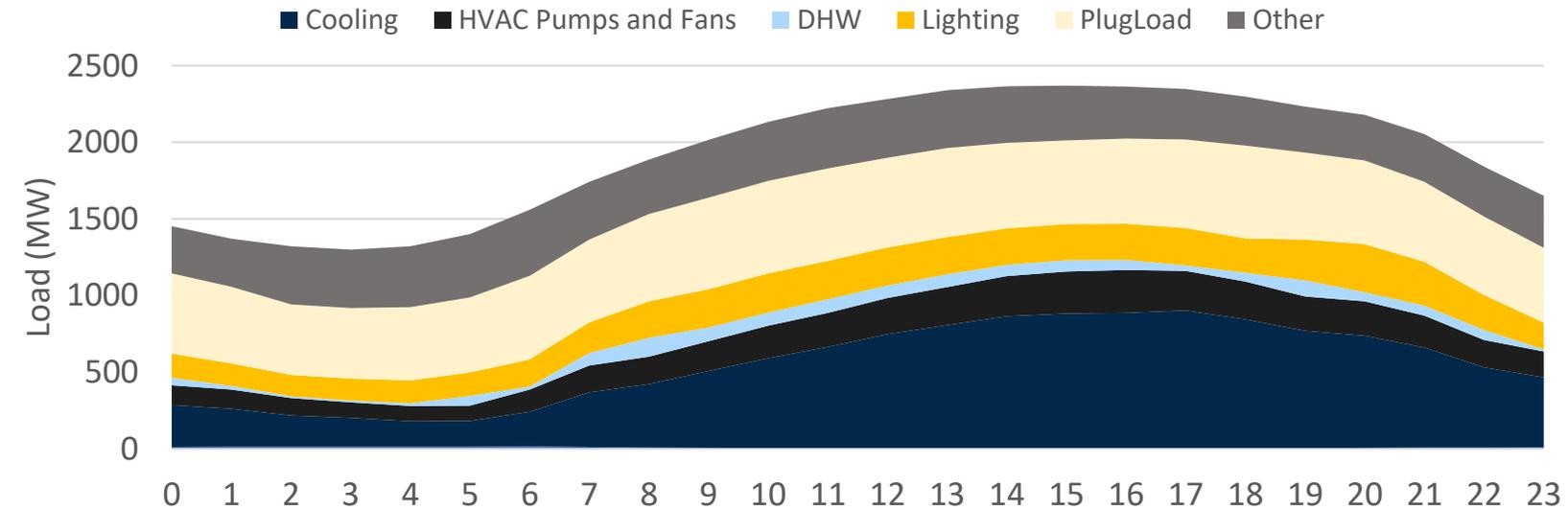
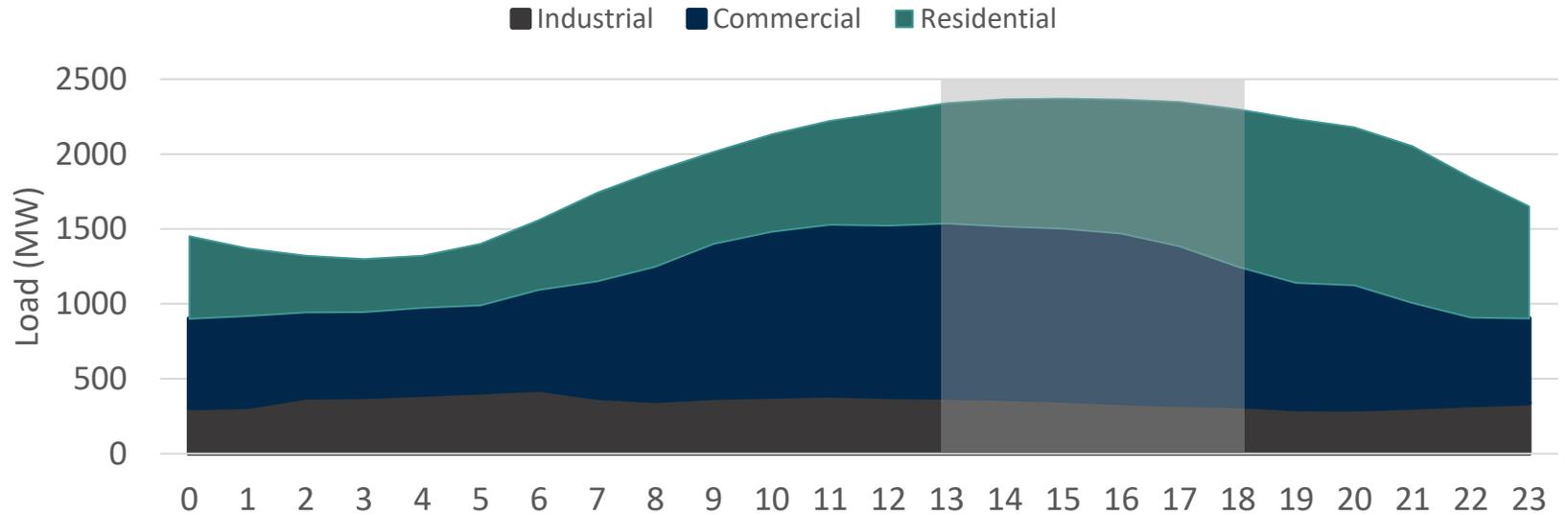
Expanded DR programs with maximum cost-effective incentives

*Current DR incentives are based on Eversource 2020 Incentive Levels

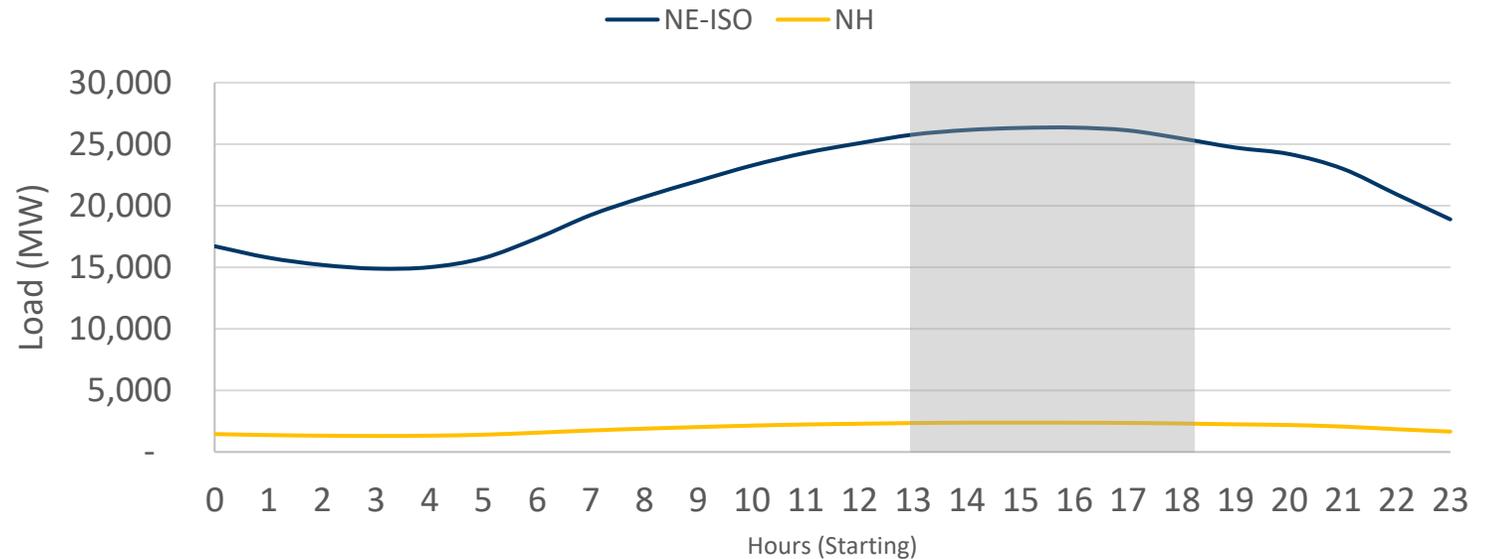
Active Demand: NH Peak Load Breakdown

- Peak hours: 13:00 - 17:00 (hour starting)
- Peak driven by cooling demand in summer months
- Industrial load is included in the “Other” end-use, comprising the majority of this end-use’s contribution to the peak demand

Year	Projected Annual Peak (MW)
2021	2,370
2022	2,372
2023	2,385

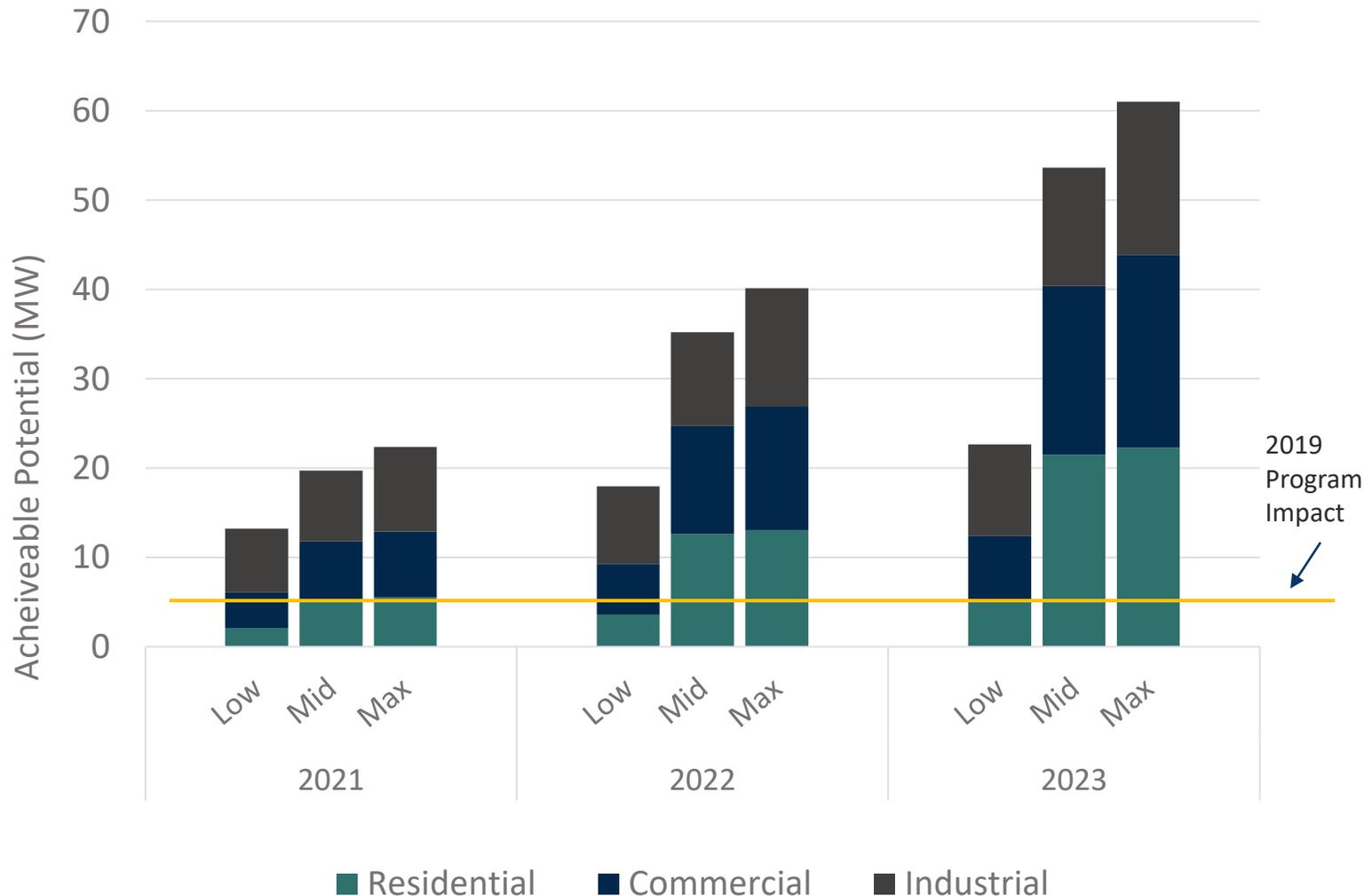


- Peak hours:
13:00 - 17:00
(hour starting)
 - Aligns with NH peak load window
- NH load is responsible for a little under 10% of ISO-NE peak demand



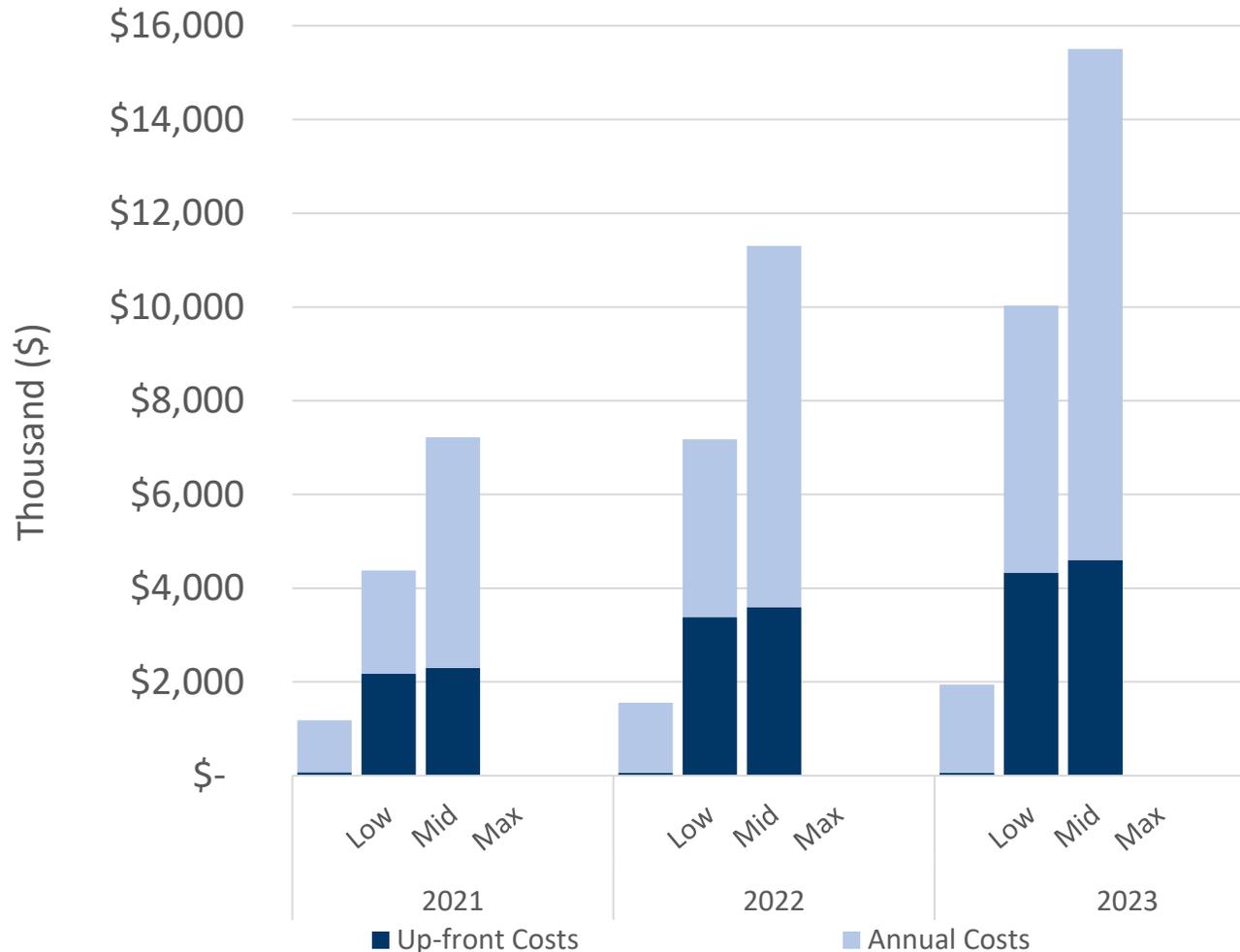
- NH load has similar shape as ISO-NE – but order of magnitude lower amplitude
- Fluctuation in NH demand has little impact on overall ISO-NE demand curve shape
- Limits/Eliminates concerns of bounce-back/shifting of ISO peak period due to NH DR programs

Achievable Potential (MW) by scenario



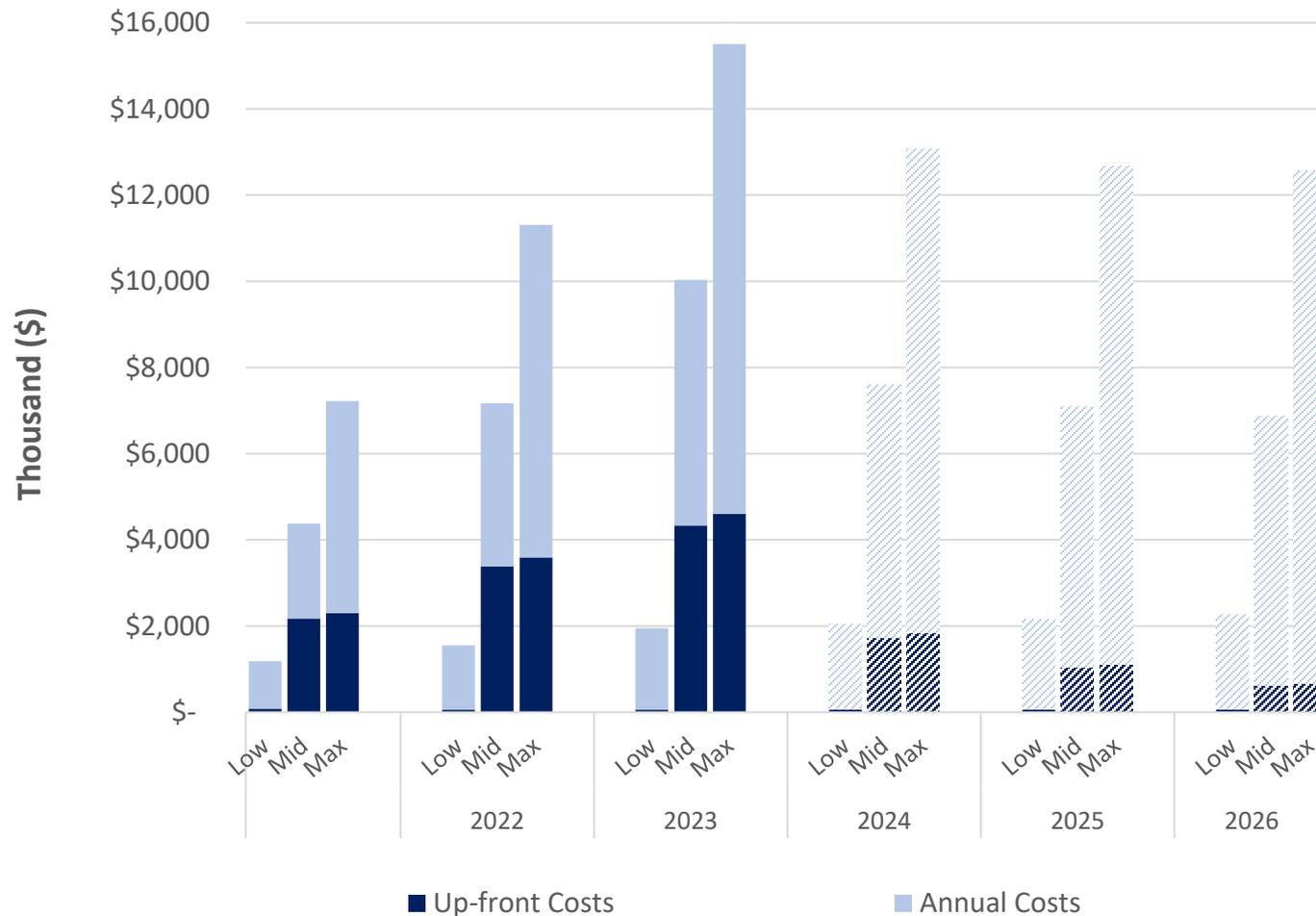
- Economic potential assessed at: 274 MW
- Residential DR shows notable room to grow under Mid and Max scenarios
- Expanding the program offer (new measures) and increasing incentives both have an important role in increasing the DR potential
- Net impact (2019) of existing programs is 6.9 MW (Industrial and Commercial Curtailment)

DR Portfolio Costs by scenario



- Increasing DR impacts come at significantly increased cost
- Expanding programs (Mid and Max scenarios) involves notable investment in early years
- Maximizing incentives significantly increase the costs for a limited savings potential (Max scenario)
- Keep in mind: DR savings persist for as long as the programs are active, so benefits streams post 2023 assumed that a measure can deliver savings for 3 to 9 years

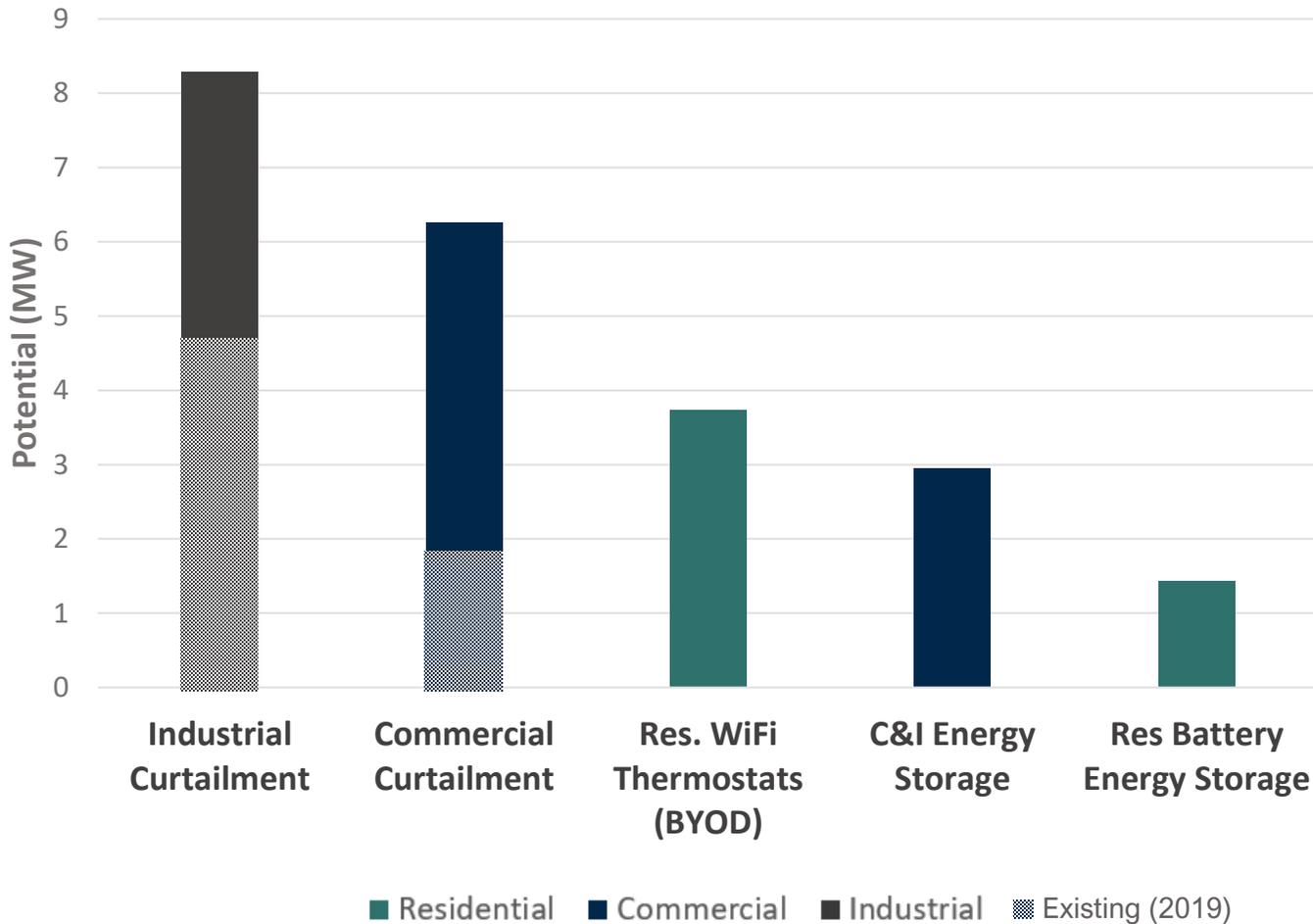
DR Portfolio Costs by scenario - Projected



- Investments in upfront equipment and program set up costs over the study period, can support DR program savings in subsequent years
- In later years the upfront costs diminish as incentives maintain program participation among customers with installed DR devices

Note: 2024-26 costs are illustrated to demonstrate the expected program cost trends. No model results were generated for these years.

Top 10 Measures: 2023 Achievable Potential (MW)

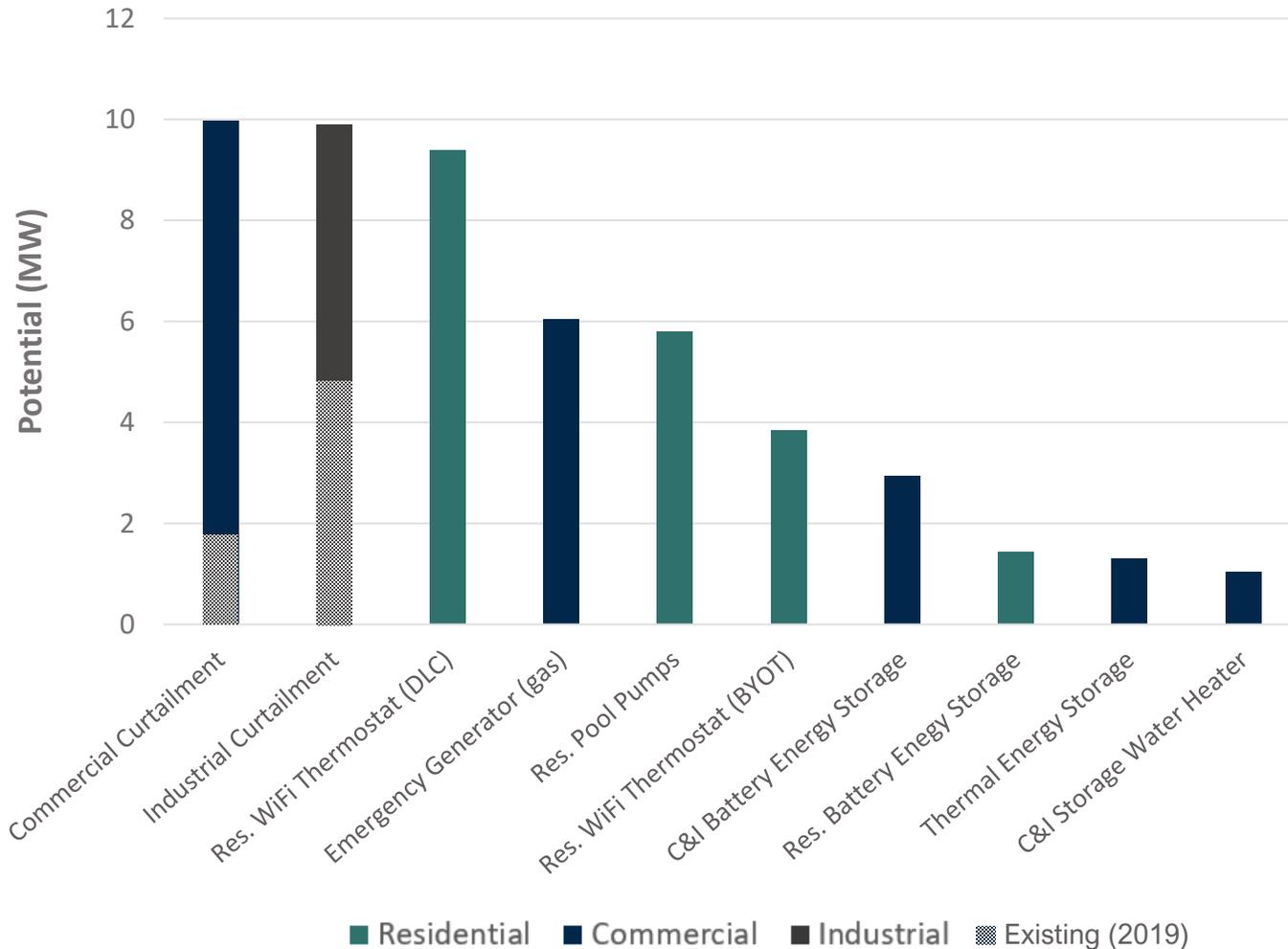


- Existing C&I curtailment, both commercial and industrial, has room to expand by bringing in new participants
- Residential measures have limited expansion potential due to market saturation.

Program (2023)	Granite State Test*
Res. BYOD	1.4
Med. & Large C&I Curtailment	3.3
C&I Energy Storage	1.4
Res. Energy Storage	0.7

*Results over the program lifetime (9 years) for new capacity added

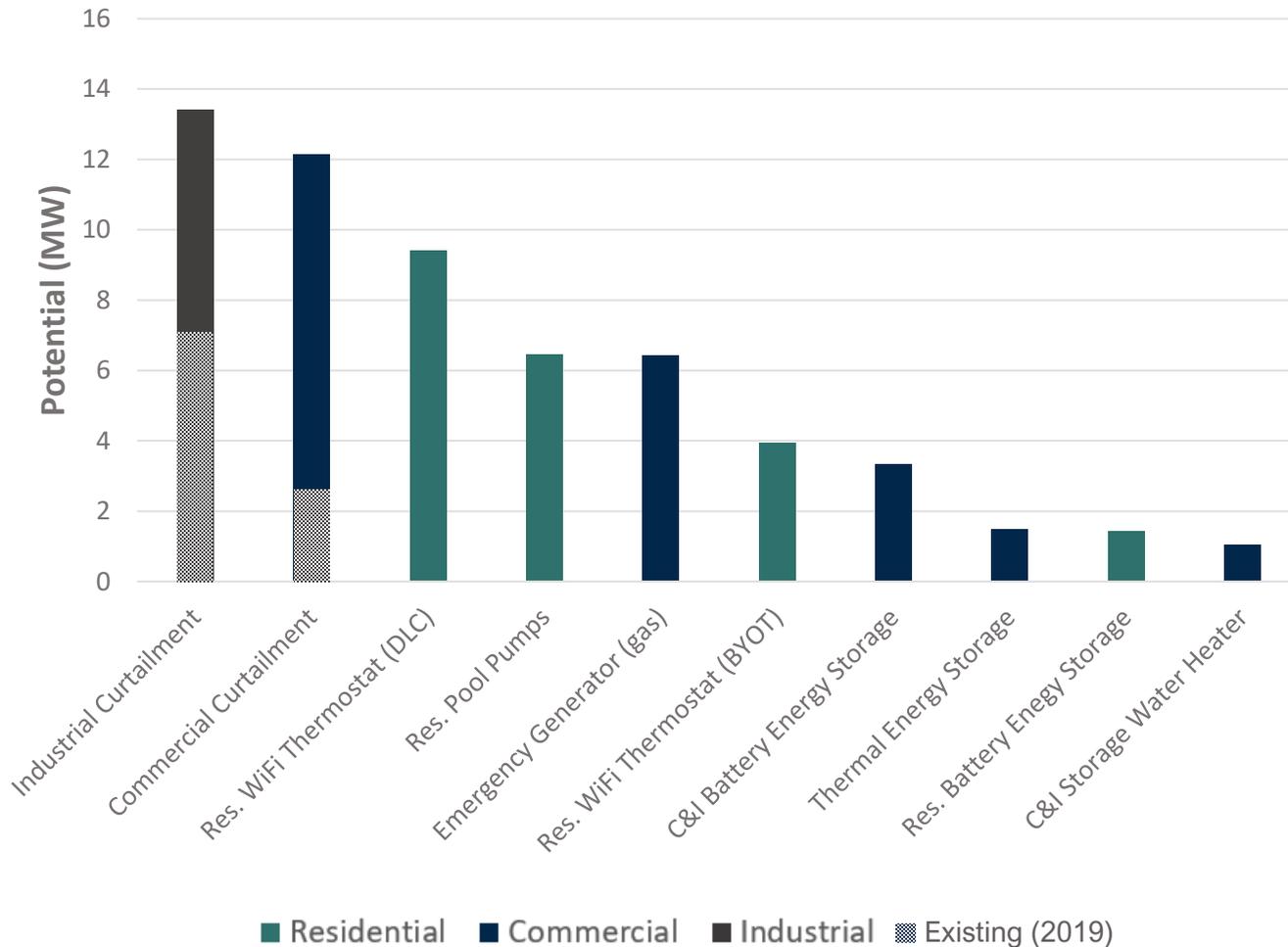
Top 10 Measures: 2023 Achievable Potential (MW)



- C&I Curtailment has the most potential, and the highest cost-effectiveness
- Residential is again a key sector, with expended measures now including pool pumps

Program (2023)	Granite State Test
Res. DLC	1.1
Res. BYOD	1.2
Small Comm. BYOD/DLC	1.1
Med. & Large C&I Curtailment	2.7
C&I Energy Storage	1.2
Res. Energy Storage	0.7

Top 10 Measures: 2023 Achievable Potential (MW)



Minimal overall change between Mid and Max scenarios due to flattening adoption curve

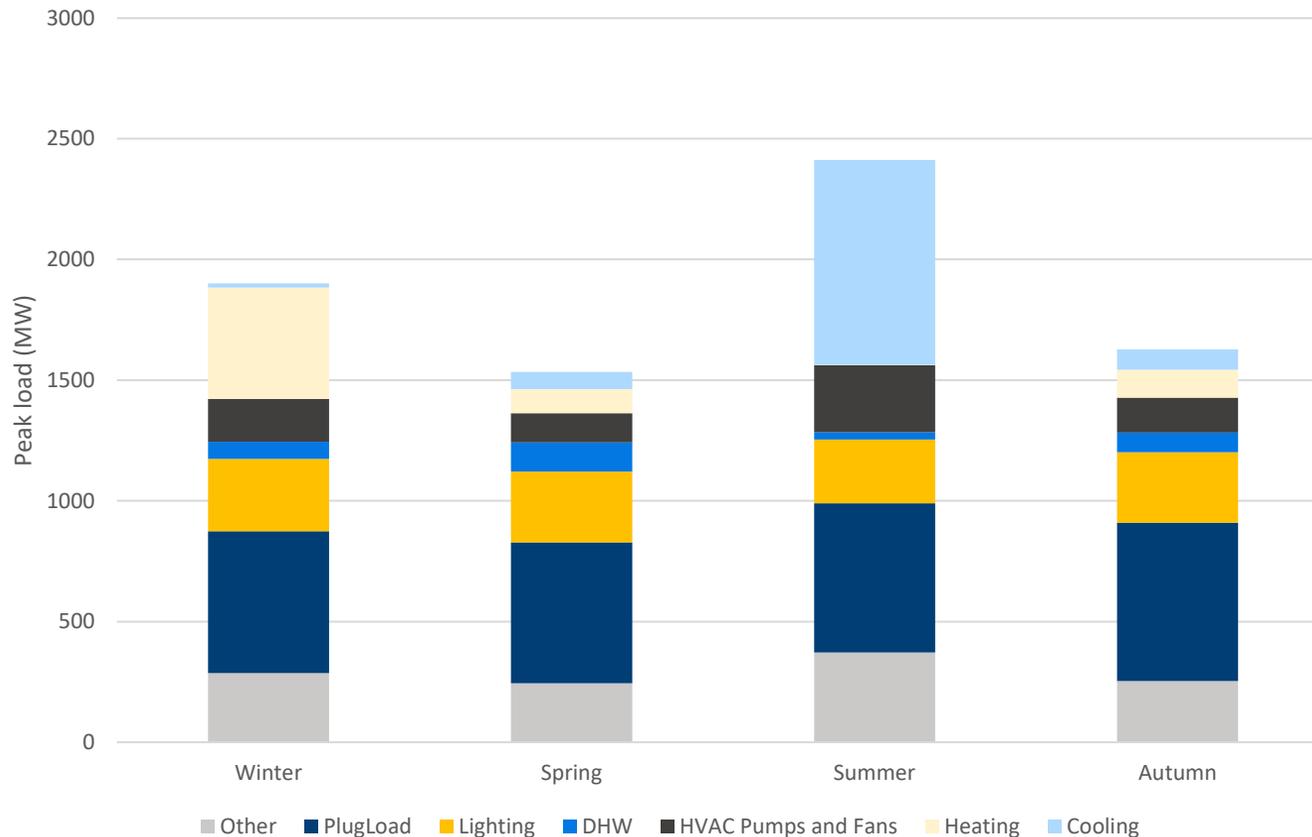
Incentives adjusted to maintain cost-effectiveness

Program (2023)	Granite State Test
Res. DLC	1.1
Res. BYOD	1.1
Small Comm. BYOD/DLC	1.0
Med. & Large C&I Curtailment	1.2
C&I Energy Storage	0.8
Res. Energy Storage	0.7

- Expanding industrial and commercial curtailment offers the most potential to increase DR impacts, and are the most cost-effective options
 - Consider incentives targeting backup generators
- There is room to expand residential Bring-your-own device program for Thermostats
- Expanding the program offer (via new measures in the Mid scenario) and increasing incentives both have an important role in increasing the DR potential
- Overall, results are in line with other recent DR potential assessments
 - Horizon is shorter (3 years) than most other DR potential studies, which may explain why results are somewhat lower

	New Hampshire (Max 2023)	Massachusetts (2018)	Michigan (2017)	Northwest Power (2014)
Portion of Peak Load	2.6% (summer peak)	3.5% - 4.0% (summer peak)	4.4%-7.7% (summer peak)	8.2% (summer peak)
Avoided Costs	\$210 / kW (in 2021)	\$290 / kW	\$140 / kW	n/a

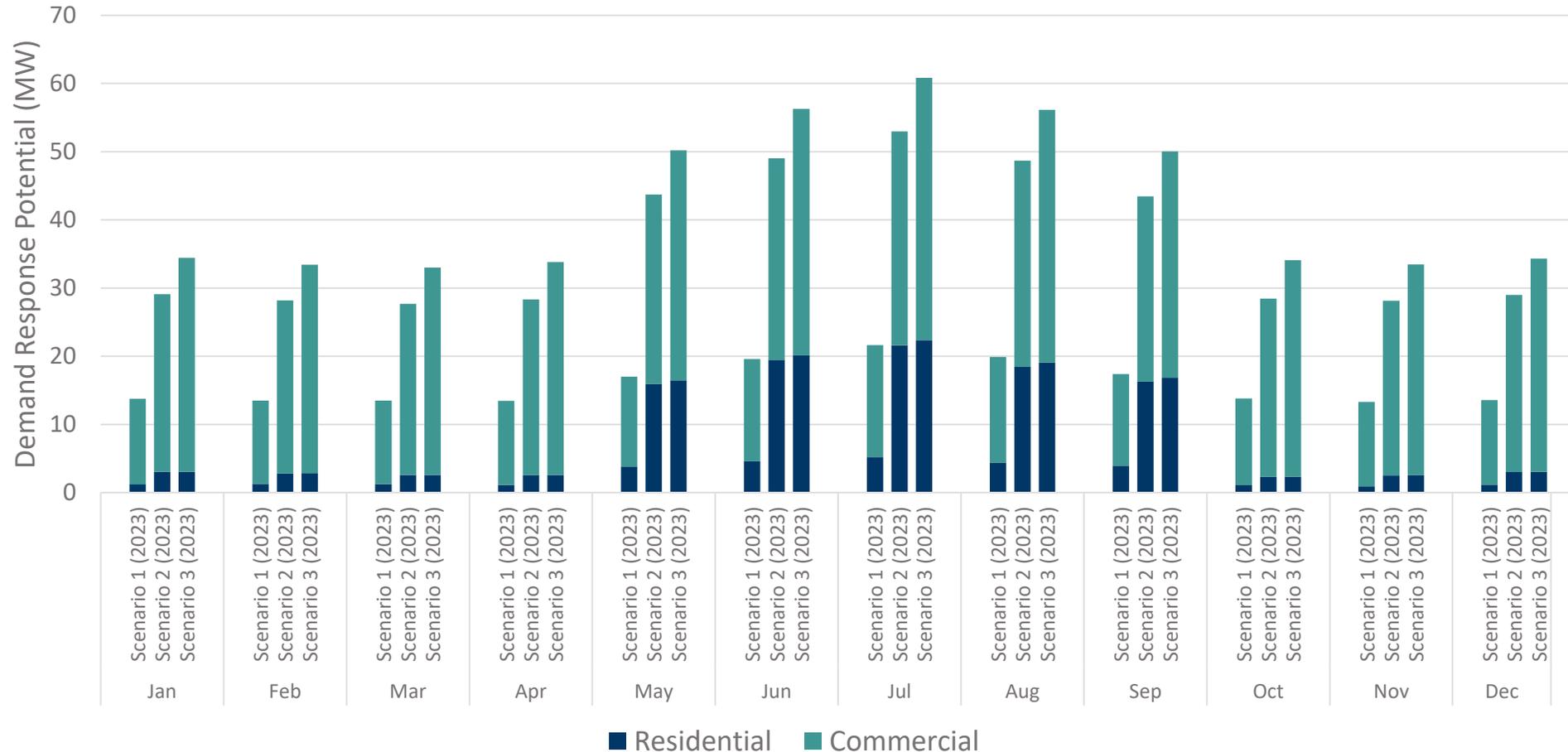
Peak Load Hour (MW) by End-Use



- Peak hour is generally consistent among all seasons – thus summer DR measure characterizations are relevant for shoulder and winter savings assessments.
- Cooling systems represent 35% of the peak load in summer (47% including all HVAC load).
- 1,235 MW of the peak load contributions do not vary by season.

Season	Peak Hour (hour starting)
Winter	17:00
Spring	19:00
Summer	16:00
Autumn	18:00

Monthly Achievable Potential (MW) by Scenario



- An important part of the DR potential can be achieved on a monthly basis with an appropriate program design
 - 50% of the low scenario potential comes from controlling loads that are not impacted by the season
 - For the Mid and Max scenarios, 27% stems from storage energy systems and 17% from all year long C&I curtailable load
 - Most of the residential achievable potential is targeting summer loads (cooling, pool pump). Therefore, it is not applicable for non-summer months.
- Current C&I curtailment program could also address some of the monthly peaks while energy storage systems offer an even greater flexibility.
- Programs targeting the residential sector are essential to address winter loads
 - WiFi thermostats program could include a specific design for winter applications for customers with electric heating
 - Smart appliances such as clothes dryers are not cost-effective when solely considering summer loads but could be by pursuing winter loads
 - Dual fuel heating systems could be explored

